RAILROAD GAZETTE

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Contributions

What is a Rational Basis for Accident Statistics?

Chicago, Feb. 15, 1904.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your review February 12 of my recent pamphlet on Railway Accidents in the United States and Europe you reject the conclusion of its comparisons because you think that some other unit than mileage should be employed as the basis of such comparisons. To use your own words the average casualties per mile of road "is entirely worthless, for the reason that density of traffic —not miles of road—must be the main factor in the computation of any average that is to be a true index of the danger or safety of railroad travel."

No one can be more conscious than I am that mere mileage is an unscientific and not wholly satisfactory basis for such comparisons as I sought to make. But a close study of the subject and extensive inquiry among men who have devoted more years than I have months to practical railway affairs, convince me that there was no other single basis, common to railways the world over, upon which an approach to satisfactory computation could be made. You suggest "density of traffic" as the main factor, and when you come to apply that factor you ignore length of haul, weight of cars and trains, physical and climatic conditions and a score of other things that render anything like a scientific comparison of railway accidents impracticable and unconvincing.

But because we are denied the possibility of a scientific basis is no reason why we should not arrive at some rational basis, and one that would not be wholly and palpably unfair to American railways. There is no excuse, in my opinion, for persistently prejudicing the American side of the comparison by ignoring the fact that we have nine times the British mileage, and, I believe, nine times the actual basis or opportunities for railway casualties. So far as the returns show, here are the accepted facts or approximations:

	United States, year to June 30, 1902.	United Kingdom, year 1902.
Track, single, miles	202,471	22,152
Track, double, miles	13,720	11,329
Track, three, miles	1,204	194
Track, four or more, miles	895	827
Track, yard and sidings, miles	58,220	....
Total track	276,510	34,502
Employees (U. S., 1903)	1,333,000	575,834
Passenger traffic—		
[1]Number carried, millions	711	1,320
[1]Number carried one mile, millions	21,543	9,140
*Train mileage, millions	407	227
*Average journey per passenger, miles.	30.30	7
Freight traffic—		
[1]Tons carried, millions	1,363	437
[1]Tons carried one mile, millions	178,680	17,494
*Train mileage, millions	500	170
*Average haul per ton, miles	131	40

* U. S. Report, 1902. [1] 1903.

Out of the crucible into which all these factors must be cast in order to arrive at an approach to a rational basis for comparative analysis we can pluck these three salient facts:

While British railway passengers outnumber American nearly two to one, so short is their ride that in passengers carried one mile the American roads surpass them 2 1/3 times.

While American roads carry a little over three times as many tons of freight as the British, so much longer is the average American haul that the tons carried one mile are over ten times as many.

The American railroad employees outnumber the British 2½ times, despite the fact that thousands are classed as railroad employees there who are not here.

Now it is a question whether these decisive factors should be added together or multiplied to arrive at the average unit of opportunity of railway casualties in the respective countries. Merely considering them as cumulative factors, we arrived at a total of nearly 15 units of chance for an accident on American roads to one on British.

And yet the *Railroad Gazette* says that my averages are "entirely worthless," because I have based them on the mileage unit and not on density of traffic, where the ratio is only 9 instead of 15 to 1.

Passenger and train mileage are the most pertinent factors in these statistics, but they are incomplete as furnishing a working basis without employee mileage, especially as trainmen furnish 80 per cent. of the victims of train accidents among employees.

As it would be even more impracticable to follow the comparisons through the varied and incomplete railroad statistics of other European countries I adopted a mileage basis common to all countries and, as the above statistics demonstrate, erring if at all in leniency to foreign railroads.

You say that if season ticket passengers were counted on the English roads as in American statistics the English total would be increased "to perhaps 1,500 millions." They were counted in 1902 for the first time and found to be 592,570, and their number of journeys approximated at 132,000,000, making the total as given above.

Your assumption as to my figures of Chicago roads embracing "a larger proportion of 'thin' lines than would be the case with roads further east" is not warranted. But if it were it would not apply to those comparisons in which I include all the great roads running out of New York, with one exception.

The error in my statement of the loss and damages on British roads was due to a slip in writing 1902 for the 1901, to which all my foreign figures refer, and this you correct by giving the loss for 1902 while retaining the mileage for 1901. [Mileage increased 1/3 of 1 per cent. that year.—EDITOR.] The comparison was equally illuminating whether the British loss was $4,258,080, as it was in 1901, or $3,847,000, as it was in 1902; since nine times the latter figures yields a loss nearly 40 per cent. greater per mile than on American roads.

In regard to the instances I gave of "disastrous train accidents occurring" in spite of the block signal system, the statements were taken from and credited to the bulletins of the Interstate Commerce Commission and bore direct or internal evidence to the fact that they occurred on roads protected by that system. Therefore, they were pertinent to show that something besides signals was necessary to the safety of railroad travel in America.

As for the ancient myth "that the railroads of England run many more fast trains than do those of this country, I am surprised at the *Gazette* reviving it in the presence of Mr. George G. Tunell's demonstration of "the overwhelming superiority at every point of the American train service." Unless my eyes and memory have deceived me the *Gazette* itself has taken an effective hand in the same demonstration.

Thanking you for your courtesy and space, I am, etc.,

SLASON THOMPSON.

[Putting figures into a crucible never clarifies them; it converts them into pi; and plucking figures out of pi, either before or after the crucible is heated, never does any good. The trouble seems to be the difference between facts and assumed facts. In what publication does Mr. Thompson find the total mileage of passengers on the British railroads? We do not know it, and Mr. Thompson should not assume it. The "belief" that there are nine times as many opportunities for railroad casualties in America as in Britain is unscientific, as Mr. Thompson agrees. It is also irrational, for the reasons which we gave. Length of haul is taken into account in computing density of traffic. As the number of season-ticket passengers reported by the British roads must be multiplied by 626, the number of trips for which such a passenger pays in a year, that class of mileage would be nearly 371 millions, not 132 millions. As we read the Interstate Commerce Commission Bulletin the records of collisions cited by Mr. Thompson and referred to by us bear direct or internal evidence that they were not on railroads using the block system. "The overwhelming superiority" which characterizes American train service in some particulars does not modify the fact that leading English roads run numerous fast trains where leading American roads run but a moderate number. There need be no fear, however, that this fact will afford any real comfort to the wicked persons who are persistently prejudicing the American side of the comparison. We forbear to take the reader's time to consider ton miles, or weight of cars, or climatic conditions; for the mileage of trains, which we did consider, is a more nearly scientific basis than all of these other factors put together. Employees' mileage, if it could be had, would afford no appreciable information beyond what is already available in the statistics of train mileage. We print the figures given above by Mr. Thompson because we do not like to abridge his letter; but he makes no use of them except in connection with assumed figures of English passenger mileage and ton mileage, and, therefore, we do not analyze them. It remains true that men employed, passengers carried, and train miles are essential factors in any fair comparison of casualties; and that to compare on an even basis 23,000 miles of road having a given density of traffic with 23,000 miles where the density is far different is misleading.—EDITOR.]

Performance of Automatic Signals in Cold Weather.

BY H. S. BALLIET,
Assistant Engineer of Signals, Lehigh Valley Railroad.

The principal railroads which have in service automatic block signals report that the weather conditions during January, 1904, were the most severe since the signals have been in use. Snow storms and blizzards were frequent. Generally speaking, the snowfall was the heaviest in years, 14 inches being a common depth. The thermometer on the coldest days recorded from zero to 42 deg. F. below. The period of extreme cold lasted about 30 hours each time and on several occasions the temperature moderated from 20 deg. to 40 deg. within a few hours. These sudden rises were closely followed by lower temperature. In one case the record shows 40 deg. decline within five hours. This decline occurred after the thermometer registered 35 deg. above zero.

The performance of automatic block signals under such adverse weather conditions has been, on the whole, admirable. Care, skill and forethought have been exercised to anticipate interruptions to satisfactory working. There are, however, several details which might be improved. It is the intention to confine this article to the more important failures which have been observed during the above-named period.

A number of cells of gravity or bluestone track battery were found frozen into a solid mass of ice. Most of these cells were in chutes constructed of 2-in. lumber and about 8 ft. in depth, or in cast-iron chutes of sufficient length so as to bring the lower cell about 7 ft. below the surface of the ground. Careful inspection indicates that most of these cells were frozen in consequence of the improper filling in of earth when the chutes were set. As a rule, too many stones are used to fill up and not enough earth. The best practice is to fill in with earth or, preferably, ashes. Chutes are sometimes set too close to stone walls. In extremely difficult places mineral wool should be used to protect 12 or 15 inches of the chute where it enters the ground as well as to make an additional cover for the top of the chute.

Gravity battery used for other than track circuits is always placed in wood or iron wells from 5 ft. to 8 ft. deep. These batteries were frozen in but few cases and then the trouble was apparently due to the absence of "frost breakers"—doors in the well some distance below the outside cover. Like track battery chutes, these wells need earth or ash protection up to the top covering.

Some batteries operating motor signals and their controlling electro magnets are kept above the ground line in the base of iron signal poles. In this situation many cells made up of a water solution of caustic potash were frozen solid. Where the cells were surrounded by newspapers, mineral wool or hair insulator, their e.m.f. was reduced because the cells chilled; but where these batteries were underground they delivered current uninterruptedly.

Batteries having a water solution of caustic soda which were above ground (in the base of iron poles) without further protection, or in shallow wood wells set on the surface of the ground, gave no indication either of reduction of e.m.f. or of freezing. A number of storage battery cells located in unprotected places delivered current without any decrease in e.m.f. and there was no apparent inclination to freeze. At 34 deg. below zero in a fairly well protected wood case, but in close proximity to a river, several cells of dry battery were unaffected and performed their function without any apparent decrease in e.m.f.

A great many relay points both normally open and normally closed were affected by the intense cold, quantities of frost, moisture and ice being deposited on them. In some cases the interruption to the passage of the current was temporary, while in others the signal continued to fail until the obstruction was removed by the repairman. Relays with platinum contacts were affected more quickly than those having a carbon contact. These interruptions were not confined to what is known as the open relay, they were also observed on relays with sealed glass covers. The steady cold did not appear to do the harm; it was the rise in temperature followed within a short time by a decline, which caused the moisture which was deposited to freeze and form frost or ice, depending upon the quantity of moisture. In a few instances, the change was so extreme as to cause sufficient moisture to be deposited so the armatures were frozen into whatever position they occupied. It is only fair to state that the major portion of relay contact failures occurred where the relays were enclosed in the cases at the bases of iron signal poles, or in iron relay cases. Where wood relay cases were in service, a small percentage of frost failures caused interruption, although many were found with a deposit of moisture. Where the wood cases were located on the shady side of a post no moisture or frost was traceable.

The accumulation of frost and ice was not confined to

relays alone; the mechanisms and controlling parts were also affected. These conditions were noted in all designs of automatic block signals. Apparatus enclosed in iron cases without ventilation appear to have suffered most; iron cases with ventilation not so much, and iron poles with whole or partial wood lining appear to have had about the same interruption as those with ventilation.

Where the mechanisms were enclosed in cases built principally of wood but few interruptions were noted.

The use of oil lamps kept burning continually to keep the air dry, has met with but little success. The most effective preventive of moisture troubles that has been found is ventilation. This is generally accomplished by having a number of openings cut into the side of the cases, allowing the air to circulate freely; but even this has been ineffective in many instances. The circulation can be maintained by means of an electric fan within the case or enclosure.

The accumulation of frost and ice is confined to localities where the air is moist. The area of moisture-charged air is not well defined. There are cases where this area extends from 25 to 40 miles on either side of large bodies of fresh water; again it reaches but a few miles inland from a river, creek or swamp.

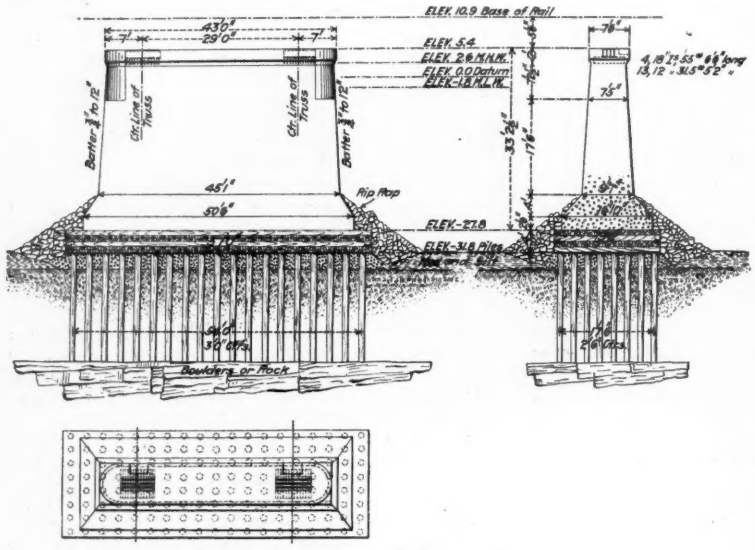
Extraordinary precautions have been taken to protect motor commutators against frost by enclosing them in felt, flannel, glass, celluloid and brass; but no positive relief seems to have been accomplished.

On certain signals within 2,000 ft. of salt water electric motors have been in operation for several years without interruption or a trace of frost or ice, and no covering of any description is or has been used to prevent it.

Some interruptions have been reported due to the breaking of line wires on account of sudden contraction. These breaks appear to be confined to iron wire exclusively, except in cases where copper has been strung a second time, the breaks occurring where kinks were introduced by handling.

A close study of the various designs of apparatus develops the lesson that more margin should be allowed for moving parts, *i. e.*, more air gap should be allowed. If applied, this would mean a slight increase in maintenance, because it would involve the application of more voltage on each circuit.

The experience of this winter seems to have demonstrated that the power to operate automatic block signals should in all cases be located at the signal post. Under such a system, the failures are confined to a few signals. Where a series of signals is operated from a common point, a break, or interruption in the main, causes the failure of a number of signals. A few such cases have occurred during the month under review.

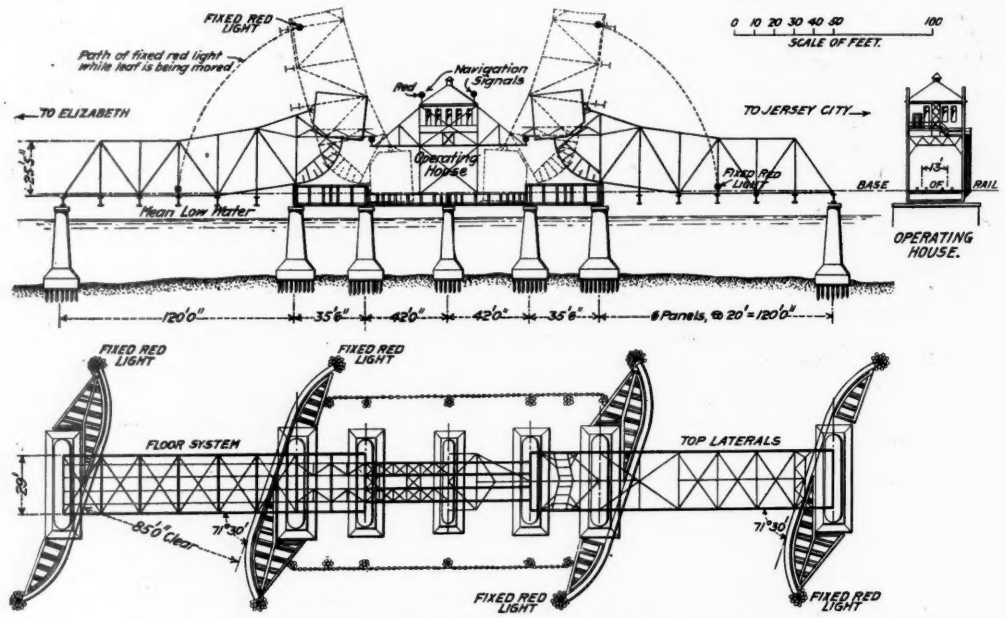


Detail of Foundation for Pier No. 3.

Scherzer Rolling Lift Bridge Over Newark Bay.

The double-track main line of the Central Railroad of New Jersey enters Jersey City over a pile and timber trestle, 1½ miles long, across the lower end of Newark Bay. The opening at the dredged channel, a short distance east of the center of the trestle, is spanned by a steel center-pier swing draw which has been in use for a number of years but which some time ago was found to be unsuited to accommodate the very heavy freight and suburban traffic which passes over it. This line is used for the numerous suburban trains of the Jersey Central and for all the through trains of the Philadelphia & Reading and the Baltimore & Ohio to Philadelphia and the South. During the morning and evening rush hours trains pass over it at intervals sometimes as close as two minutes. There are always large numbers of vessels passing through the channel to and from Newark and other cities on the Passaic and Hackensack rivers, a majority of which are barges and tugs. Owing to the swift and uncertain tides vesselmen are compelled to pass through the draw at times when the tide is favorable regardless of the interruption of train service over the bridge and with the present type of draw it requires the same opening to allow a barge to pass as to allow a masted vessel to go through, inasmuch as the tops of the rails are only 11 ft. above mean tide water.

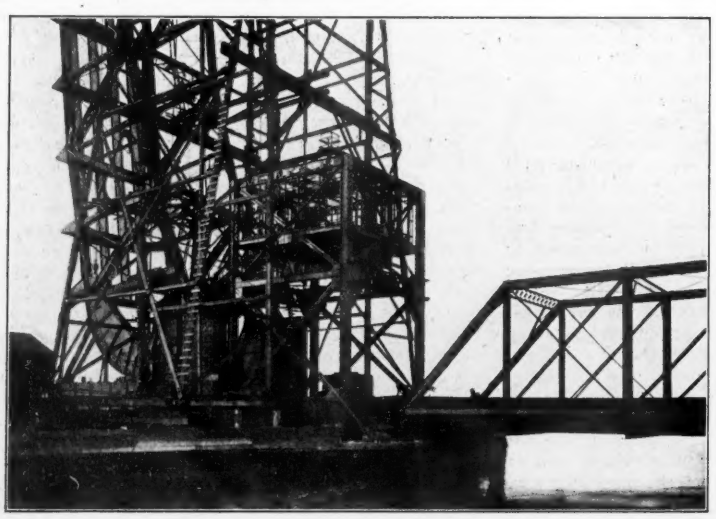
It was decided to replace the present span with a modern type of bridge and careful studies were made of the cost and adaptability of the different types of movable bridges to meet the existing conditions and the requirements for future expansion. It was essential that the new bridge should readily permit the building of additional tracks and drawbridges at some future time should the necessity arise. Four tracks are now used on both sides of the bay and the possibility of extending them across the trestle was of course taken into consideration. The maintenance of an uninterrupted train service during the erection of the new span and the dismantling of the old was another important point. In building a new center pier swing bridge on the site of the old span it would have been necessary to erect a temporary trestle and draw to one side of the present structure and divert all trains over it. It would also have been necessary, in order to provide for future tracks across the bay, to have erected a four-track bridge at the present time, although only two tracks are now needed; for, if only a double-track swing bridge was put in it would have to be discarded and replaced by another of greater capacity as soon as it was decided to increase the number of tracks crossing the trestle. A four-track swing bridge would also have increased the height of the tracks above the water on account of the heavy drums and rollers required and this would require the elevation of the entire trestle for a considerable distance on each side of the opening and the consequent introduction of undesirable grades.



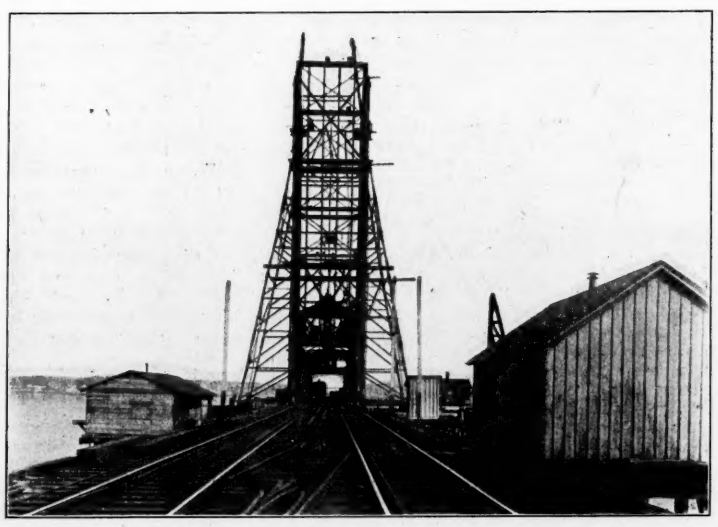
General Plan and Elevation of Scherzer Rolling Lift Bridge Over Newark Bay.

After a careful consideration of all the types of movable bridges and consultation with the War Department it was decided to put in a Scherzer rolling lift bridge as meeting most satisfactorily the conditions of present and future traffic. A provision of the charter of the railroad company required that two channels should be maintained for navigation and plans were therefore drawn for two double-track single-leaf, Scherzer lifts, placed back to back and each bridge independent of the other in its operation. Work was begun on the foundations about a year ago, and on Sunday morning, Feb. 14, the completed west leaf was lowered into place on its supports from the upright position in which it was erected. Regular train movements had been maintained throughout the erection without changing the alinement or grade of the tracks and was only interrupted for a few hours while the bridge was lowered for the first time. Trains were run over the Newark branch during that time.

The accompanying drawings show the general outlines of the new bridge and the details of one of the piers. The dredged channel at this point makes an angle of 71 deg. 30 min. with the center line of track, and in order to preserve the clear channel openings of 85 ft. fixed by the War Department, the two spans were each made 120 ft. long. The center pier of the present swing draw, which has openings of 70 ft. and 75 ft., stands about in the middle of the east channel. Seven piers were sunk for



Scherzer Lift Bridge During Construction, Showing Old Draw Span.



End View of Bridge Showing Train Running Under.

the new bridge, three for each span and one on which the operating tower is supported.

The piers are an interesting example of marine foundation work. In the foundation for pier No. 3, counting from the west end, piles were driven through the clay down to bed rock over an area 54 ft. x 17 ft. 6 in. and spaced 3 ft. center to center, the length of the rectangle and 2 ft. 6 in. across the rectangle. They were cut off to an even surface on top about 4 ft. above the hard bottom which had been exposed by dredging. Broken stone filling was put in around the pile heads up to El. 31.8. The pier was built as a concrete monolith in a floating caisson or mold of which the grillage formed the bottom. This grillage was made of four thicknesses of 12 in. x 12 in. timbers laid close together in alternate layers of headers and stretchers, the whole being 57 ft. long and 19 ft. 6 in. wide. When the concrete had set the caisson was sunk on the pile tops and the sides of the mold removed. Riprap was then thrown in around the base of the pier and the concrete brought up to El. 5.4, level with the bottom of the track girders, and finished off. The body of the concrete pier is 9 ft. 7 in. x 45 ft. 1 in. at the top of the base and has a batter on all four sides of ¾ in. to 1 ft. The height of the monolith is 33 ft. 2½ in.

The east and west spans are identical. They were designed in accordance with Cooper's E-50 specification to carry on each track, two locomotives weighing 187½ tons apiece followed by a uniform load of 5,000 lbs. per lineal foot of track. The side trusses are spaced 29 ft. center to center and each is divided into six panels with a single diagonal member. Between the centers of top and bottom chords is 25 ft. 5 in. and the clearance height under the top laterals of the bridge from base of rail is 22 ft. 6 in. The floor girders between trusses are carried across under each post and resting on them are the four deep stringers, one under each rail. Lateral bracing is built in in both the floor system and top laterals. The rockers and counterweight frames are built out as extensions to the main trusses and do not encroach on the clearance width. Between piers 2 and 6 the tracks are carried on four deep plate girder stringers resting on the intermediate piers. Although the base of the rail is only 4½ ft. above extreme high water, all metal parts of the bridge are well above the water line both in the open and closed position. Special means were provided to make the bridge safe for the passage of trains over it at high speed. The rails are firmly spiked to all the ties and the joints between the fixed and movable spans make a close connection and give a continuous and perfect alinement. Both spans will be equipped with a complete interlocking plant protecting the tracks on both sides of the draw.

The steel operators' house is built over the tracks between the draw spans and contains the interlocking machines and the engines for operating the draw. These engines are 75-h. p. three-cylinder gasoline engines made by Fairbanks, Morse & Co. While the engines are mounted inside the house, all of the operating gear is outside. At the ends of the cantilever arms built out from each side of the house are mounted the train of gears for actuating the rack arms pivoted to the top laterals. The shafts leading out from the engines in the house have bevel gears on the ends which engage with gears on the main shaft of the reducing gears mounted on the cantilever arms. The rack arms are light trusses having rack teeth on their lower edges and running under an idler wheel mounted over the pinion to keep the rack always in engagement with the pinion. The two engines are so arranged and connected with the bevel geared shafts that each may operate one or both bridges, simultaneously or at different periods.

The bridge and piers are protected from drifting boats or ice floes by the usual pile and timber fender walls on each side of the channels and by clusters of piles driven well into the hard bottom, between which will be stretched heavy cables. This protection will be put in between the fender walls both above and below the bridge.

When the west leaf is completely finished and in working order it will be put in service and the work of erecting the east leaf begun while the old swing bridge channel is closed to navigation. On the completion of the east leaf the swing bridge will be floated out and the lift span lowered to place. At any time when it becomes necessary to four-track the trestle, another pair of lift spans can be installed without in any way interfering with the operation of the present bridge.

The Scherzer Rolling Lift Bridge Co., Chicago, Ill., furnished all the plans and specifications for the superstructure and operating machinery and equipment and also exercised consulting engineering supervision over its construction. Mr. J. O. Osgood, Chief Engineer of the railroad company, assisted by Mr. A. L. Bowman, Bridge Engineer, prepared the detail plans for the substructure and maintained a supervision over the entire work of construction. The Pennsylvania Steel Co. built and erected the superstructure and the Bethlehem Steel Co. furnished the operating machinery with the exception of the engines. The Sanford-Harris Co. had the contract for the substructure of the bridge.

We are indebted to Mr. J. O. Osgood, Chief Engineer, C. R. R. of N. J., and to the Scherzer Rolling Lift Bridge Co., Chicago, for information and drawings.

The Birmingham Automatic Emergency Air-Brake Company, of Lexington, Va., has been incorporated with a capital of $50,000 to make air-brakes for cars. W. G. Matthews, of Glasgow, Va., is President, and Robt. Catlett, of Lexington, is Secretary.

President Eliot's Replies to the Trade Unions.

On page 107 of the *Railroad Gazette*, February 12, was printed President Eliot's address before the Boston Central Labor Union. The "quiz" which followed, being impromptu answers to questions by trade-union delegates, was quite as interesting as the address, and some of the questions and their replies are here reproduced:

Delegate Foster, of Typographical Union 13: "I desire to ask President Eliot for his advice, and I am sure we will all greatly appreciate it. Would you advise the wage-earner to abandon the trades union as at present constituted and rely upon those forces which you say make for character, intelligence and efficiency for the settlement of the industrial issue?"

"No, I would not," emphatically replied President Eliot. "What I would advise would be to change some of the objections now insisted on in trades unions, but by no means to abandon the organization. What I believe in is the rather deep modification of some of the objects which labor unions now propose to themselves—objects which I conceive do not further the real ends for which organizations exist; objects which I believe to be misdirected in that they interfere with the just liberty of the American workingman and because they interfere also with the mobility of American society. I hope I have been understood when I spoke of the mobility of society. What I mean is that condition which permits the capable boy or girl to rise and attain the best that they are capable of attaining, and I believe some of the objects now pursued by labor unions mitigate against that condition."

Delegate Kneeland, of Painters' Union 11: "I would like to ask President Eliot to instruct us trade union men in what respect the trade union as at present constituted keeps down budding ambition; in other words, to explain how they don't allow the budding ambitions to rise and develop the best that is in a man."

"I don't propose to attempt to instruct you," replied President Eliot, "as to what the regulations of the union are. You know a great deal more about that subject than I do, and therefore I am not at all in the position of an instructor. I can testify concerning my own experience in the business to which I have been devoted all my life. It is a business in which there has never been any organization whatever either of laborers or employers; it is a business in which there exists the rising scale of wages and a pension for disability. The scale of wages begins low. My first salary at Harvard College at the age of 20 was less than $2 a day. It is more now. I have had the advantage of the rising scale of wages, and pretty soon I hope to have the advantage of the pension at disability. I know nothing by personal experience of the conditions under which a member of the union really works. I have read only joint agreements; for instance, the constitutions of labor unions, etc., but I always saw in what I read various conditions which seem to me highly restrictive of the individual. For example, the provision which allows only one apprentice to a journeyman, and a limited number of apprentices in a shop. I have known a devoted union man who was unable to teach his own son his trade because of the restriction regarding apprentices. That man left the union for that reason. He felt that it was a serious restriction on his liberty and that of his son. I have observed, too, in certain joint agreements that it is made difficult for a journeyman to become an employer; the last one I read, a few weeks ago, provided that no journeyman should become an employer unless he was prepared to employ another journeyman, as well as himself and two helpers. Observe what a restriction that is on a journeyman hoping to become an employer. It is such restrictions that have persuaded me that the organization of the labor union tends to the stratification of democratic society. That is something I shall never believe in, and I don't believe the American people will when they understand it."

Delegate Collins, of the Painters' Union, referring to that portion of President Eliot's address where he referred to the strong bearing the burden of the weak, asked "How is he going to do that without injuring his own labor?"

"This question suggests to me," said President Eliot, "the effort of the unions to secure the same wages for all workingmen in a given trade. I believe that a highly inexpedient and on the whole an unkind effort. A minimum wage is fixed at what the average man can perhaps earn, but this the weak man cannot earn. What is the result? The weak man is not employed except a small portion of the time. He might be employed all the time at wages which he really earned. The union prevents him from being so employed. And I observed quite lately a similar arrangement perhaps for women. It was stated that a demand was to be made for equal wages for men and women, but we all know that women cannot do the same work as the men, and therefore it seems that the demand simply means that women will be excluded from the shops, if not all the time, at least much of the time. I venture to say that this policy of the unions is unjust and undesirable and frequently cruel toward the weaker brethren. And how is the strong man to benefit? How is the man who can do twice as much to benefit? He has the right to do it if he wants to and should be able to earn twice as much, and that is only democratic liberty."

Delegate McDonald, of the Woodworkers' Union: "When 100 men are employed in a shop, 75 of whom are union men and 25 non-union men, all of equal productive capacity, the 25 willing and ready to be employed at wages under the living expenses of the day, do you believe the 75 should exercise a certain control over the 25 which will cause them to receive for their labor at least living wages, and if so, what control?"

President Eliot replied: "So far as I understand the conditions, I should say that the 25 men had the right to do what they pleased."

Frank K. Foster said: "I would like to ask President Eliot whether you are yet of the opinion advanced by you before the Economic Club in an address delivered a little over a year ago that a scab is a good type of modern hero."

"I don't need to have that question repeated," said President Eliot, as he stepped forward to reply. "On the occasion to which allusion has been made I was not expecting to speak, but, unfortunately, sat next the chairman, and he was short of speakers and urged me to take part in the speaking, which I did not see how to escape. I quoted a remark of my own which had been in print in a book for at least seven years, and it was to the effect that a scab was a fair kind of modern hero—a pretty old statement which I fell back upon in an emergency. I am very glad to have the opportunity of answering this question.

"There seems to me to be two kinds of scabs. The more recent one is called sometimes the strike-breaker. I understand a strike-breaker to be a man who does not belong to the trade union—doesn't know the business. He is hired by the employer to make an appearance of occupying the deserted works. He is not a mechanic or operative acquainted with the business. He is what I should call a mercenary soldier; in a good many cases he carries a gun. He is not a workman. That I understand to be a strike-breaker. A bogus workman, really hired for purposes of defense or to make an appearance of occupation of the works. Can we admire such a man as that under any circumstances? He is not false to the trade because he never belonged to it. He is a mercenary soldier who makes a contract to fight for his employer. Can that man be a hero? Can that man be guided by a motive which we admire? Generally the chances are that he is not under the guidance of motives which we admire, but he is willing to risk his life on a contract; he does risk his life. He serves as a mercenary soldier and shows courage in that service. He may be a hero. The chances are he is a rather humble sort of hero. Nevertheless one of the most beautiful monuments in the world is the lion of Lucerne. The lion was stabbed with a spear, the whole attitude implies the coming of death. What does that monument testify to? To the death of the Swiss mercenary soldiers who died in defence of Louis XVI. at the French revolution when the mob stormed the palace. The mercenary soldier may yet be a hero and I don't deny the possibility of the mercenary who undertakes to break a strike being that sort of a hero who gives his life for fidelity to his contract.

There is another kind of a scab. The man who really belongs to the craft. Now can he be a hero? I suppose you have observed that in times past the heroes were not generally on the popular side. Heroes are generally men who are going against the current of their time; against the opinion of their class. Emerson says whosoever would be a man must be a nonconformist—a man who will not conform to the regulations of his class and the spirit of the times. When I say that a scab is a fair type of a hero in these days, I mean a man who takes his life in his hands and risks not only life, but comfort and the happiness of family for a principle. I don't believe that you generally can deny that a scab may be a fair type of a hero."

Mr. Frank K. Foster was again recognized and asked: "Has not the action of the courts in restraining pickets from peaceful persuasion of non-unionists constituted a more serious menace to the principle of individual liberty than all the overt acts attributed to trades unions?"

"Picketing! Peaceful picketing is the subject," began President Eliot. "Gentlemen, we had better talk plainly. There is not any such thing as peaceful picketing and we all know it. We all know that picketing is intended to deter men from going to work where there is a strike; to deter them by persuasion if possible, by intimidation if not, and in the third instance by violence. We all know that picketing leads straight to violence in all strikes where public feeling is stirred up.

"Picketing, when applied in any rough industry, so to speak—in any industry that does not require a very high degree of skill, and in which there are numbers of men ready to go into the places of the strikers—picketing means more than persuasion; it means intimidation, and if that won't do, violence. We have all seen it; we know it. You all know it, and I think that from my observation of the talk and the writings of labor leaders this is the greatest fault I have to find with them; they don't speak plainly about intimidation and violence. We know that violence is really the only means of preventing men going in to take the place in many industries. We must admit that. The question is how much violence is justifiable. It is a measure of war, and as we all know in strikes in this country measures have been resorted to over and over again which not even war justifies. During the anthracite coal strike the engineers and firemen were ordered out. Their places were taken by non-union men who had to live in the mines and who pumped them and kept them free so that after the strike they could be resumed. Compare that order to abandon the pumps with what war produced in the Transvaal. Neither party in the long strife between the English and the Boers ever attempted to damage the mines. They were defended by both. I state that simply to illustrate that violence is used. Picketing is one of the lesser forms of

violence, but it is always a form of violence. You justify it in certain cases. All I can say is that it is a war measure. As to the interference with personal liberty, the interference with liberty is with the people against whom the pickets are used, in my judgment. You may say the strikers ought to have liberty to use a war measure, the justification of it is only to be found in what justifies war and fighting."

Lighterage in New York Harbor.

Mr. A. J. Grymes, of the Erie Railroad, read a paper on Lighterage; its Advantages and Disadvantages to the Port of New York, at the February meeting of the New York Railroad Club. The floating equipment departments of the New York railroads were well represented at the meeting, and a spirited discussion on the general topic of lighterage followed the reading of the paper. After a historical sketch on the development of harbor transportation at New York and elsewhere, Mr. Grymes discussed the types of floating equipment now in use, and spoke also of some of the peculiar difficulties attendant upon the business as now transacted and of certain conditions which seem susceptible of improvement. Part of his paper follows:

The question of proper terminal arrangement and operation merits the serious consideration of the railroad managers. All lighterage agents can testify that their equipment is seriously delayed waiting for cars from the yards. It is not uncommon for a tug with a float to wait several hours at the bridge of a connecting line for one car; and frequently floats are held from 36 to 48 hours at one of the terminals before they are released. Often lighters are held for several days at the company's piers before their orders are completed or else they are towed, partially loaded (which is often necessary in case of rush export freight) and one or two boats used to complete the delivery. Much of this costly delay to cars and boats and the extra service could be avoided by terminals properly constructed and operated. Floating stock as well as rolling stock must be kept moving to earn money. The grassy boat bottom and the rusty car wheel are visible evidence of loss to the owner or operator of the property.

The operation of marine equipment is not unlike the handling of freight equipment on the rail. In order to be successful, the operating man must have a thorough knowledge of the capacity and condition of the various classes of boats and how all cargo is handled, and have his eyes wide open for its improvement. He must know his men well and maintain the necessary discipline; and like the Division Superintendent, he must be familiar with every foot of the territory over which he operates, which means an unusually long division for the New York lighterman. Tows are made up in the same order that trains are. The boats to be landed first are put in the rear tiers, and pushers are often as necessary in the harbor as on the road. We have our up-grades and down-grades—I refer to the tides. But the advantage the boat despatcher has over the train despatcher is that harbor grades change twice every 12 hours and if he is wise most of his work will be done on the down-grade. However, steamship deliveries and orders of inconsistent consignees make it necessary for us to do some "bucking." Not many stiffer grades will be found on any of the eastern roads than the hill we have to climb from Corlear's Hook to Hell Gate during the ebb tide.

The maintenance of the property is a very important item. Both technical and practical knowledge is necessary to keep the fleet in proper condition. There are within the harbor limits about 50 dry docks and plants for marine construction and repairing, representing about $10,000,000. It is not advisable for the railroad companies to maintain dry docks, wrecking equipment and derricks for heavy hoisting; it is more economical and just as satisfactory to engage independent equipment for this service.

There is no available record of the exact number of boats engaged in New York harbor lighterage business. The flotilla of the Erie Railroad, independent of the ferry boats, consists of 70 covered freight barges, 27 hand-hoist lighters, 3 steam-hoist lighters, 25 car-floats, 3 steam lighters, 2 live-stock boats and 410 harbor coal boats, 9 Sound coal boats, 12 coastwise coal barges, and 14 tugs, or a total of 575. Add to this the equipment owned by the Pennsylvania, New York Central and West Shore, D., L. & W. and Lehigh Valley, Central Railroad of New Jersey, Baltimore & Ohio, New York, New Haven & Hartford, the Long Island Railroad, the Ontario & Western, and the 30 or more independent lighterage and towing companies, and a conservative estimate will give us 1,000 with steam and 9,000 without steam, making 10,000 craft operating in the waters of the port of New York.

The value of a well-organized and properly-operated lighterage department is best known to the traffic officials of the Trunk Line roads. The Superintendent of Transportation may rush the special cars from Chicago to the tidewater terminal, but all will be of no avail unless the movement is intelligently continued by boat. It frequently happens unless we can place a lighter within an hour at any available point in the harbor for a rush westbound shipment, the New York contracting agent loses time and credit and his competitor rejoices, not at his own superior abilities, but that the lighterage agent of his line is more alert than the other fellow. Indeed, the proper handling of lighterage matters are of so much importance to the traffic department of most New York roads that they have insisted upon a joint control of the department with the operating officials.

I would like to impress upon those concerned the community of interest that exists between the railroad, steamship and domestic consignees, but which is not properly observed. The most fruitful source of trouble in our business is the demurrage bill. These bills are just as distasteful to the operator as to the man who has to pay. They could often be avoided if more care was exercised by the steamship agent who issues permits for the receipt of freight, and by the consignee who places the order for delivery of local freight. Complying strictly with the permit we frequently place freight alongside several days before the ship is ready to receive it. This not only means serious loss to boat owners but the steamship companies suffer as well by badly congested slips and the necessity of hiring extra tug service to do their shifting. And if our local friend would order his freight delivered the day he was ready to receive it instead of several days in advance, there would be less congestion of equipment at the local delivery point of our water front and he would avoid many vexatious bills for delay and decrease the cost of the lighterage departments. A fuller understanding of these conditions by the interests affected and a willingness on the part of each to consider, to some extent, the welfare of the other, would result in a much improved and more satisfactory service.

The few small wharves along the lower end of Manhattan Island one hundred years ago, with the aid of harbor transportation, have expanded, bulkheads and basins constructed until 112 miles of wharf room is now in use, exclusive of that on the New Jersey shore. To more fully understand what has been done and to appreciate the future development, it is only necessary to present the following figures of the actual distance and available wharf room of the New York water front:

Manhattan—actual miles	44	Wharf room		93
Brooklyn "	132	"		197
Queens "	116	"		132
Richmond "	51	"		69
Bronx "	105	"		113
Total	448	Total		604
N. J. shore from Amboy to Fort Lee.	30			96
	478			700

Much has been written and spoken about the excessive terminal charges at New York and the relative decline in her commerce, and most of the authorities put all the trouble in one pot and boil it down to lighterage. Their diagnosis of the case is misleading. The domestic commerce and foreign commerce of this port are two distinct subjects for consideration, and they should not be confounded. Our domestic commerce is not declining relatively nor otherwise, but is developing to a marvelous degree; and nothing is more instrumental in that development than the unequaled conditions offered by the 700 miles of water front, supplemented by our system of water transportation. This combination of natural and physical conditions has already placed New York at the top of the column of manufacturing cities, and there she must remain.

But when we consider our foreign commerce we will find a different result. There is a relative decline, and the question is—Why? Lighterage, unquestionably! We know that the rates to some other points are more favorable than to this port. We also know that our relative geographical position is not so favored as it was before the grain-producing area of the country changed! Moreover, trade currents sometimes shift for less causes and New York must bow to natural conditions. But these are the strongest possible reasons why she should discard, as far as possible, obsolete physical methods of handling her export traffic. A prominent railroad man was asked recently—why Baltimore instead of New York was selected for the tide-water terminal of a new line. The reply was, "For handling ocean traffic New York is too costly." That is the vulnerable point in the commercial armor of New York, and her competitors discovering it, forged weapons against which she has no shield.

In 1898, the New York Department of Docks requested a board of eminent engineers to investigate the conditions and recommend a plan of freight transfer that would arrest the decline which had already begun in our commerce. Their recommendation was that transfer bridges be installed at the Battery and that four tracks be laid on the marginal way from there to the North river steamship piers. The impracticability of that plan was quickly demonstrated. We have only to think of several thousand freight cars being hauled and drilled on West street, in addition to its present congested condition, to see that their theory could not be practically applied. It is a physical impossibility to bring the freight car to the steamship on Manhattan Island and the Brooklyn shore with any degree of success, but it is not impossible, but entirely practical, to take the ship to the car. There is no more reason why the lighter should be used between the steamship terminal and the railroad terminal at New York than at Boston, Baltimore or any other port. If we would counteract the natural and human agencies that favor the other ports for through business we must establish on the New Jersey shore of our harbor a joint railroad and steamship terminal, where all the railroad companies, and the steamship companies can go on equal terms; where the grain from the union elevator can be piped to the ship's hold, freight from the ship's hatches taken direct to the warehouse and *vice versa*, and the freight car from any part of the country unloaded and reloaded at the ship's gangway, thus eliminating the railroad lighter, the grain barge, the floating elevator and the $100,000 per year steamship pier.

Mr. H. L. Joyce, Manager of the Manhattan Lighterage Company, discussed Mr. Grymes' paper at considerable length. He attributed most of the present difficulties to heedless methods of delivering freight to the lighterage companies and in ordering deliveries, and believed that a consolidation of all the lighterage interests in the port would ultimately take place. He also advocated handling freight cars extensively on tracks to be built on West street, New York; a point which was sharply objected to by subsequent speakers, on grounds of the congestion now existing along the river front. Mr. Joyce said, in part:

It has been a matter of wonder and surprise to me, when traveling in different parts of this country, distant from New York, to find that the average railroad agent, who has never had an opportunity of visiting any of the seaboards, has such a primitive idea of what the lighterage system, particularly at the port of New York, is. They do not seem to have any appreciation whatever of the importance, to all trunk lines, of this link of transit, and all of them look upon the three cents deducted in the billing before pro-rating as robbery on the part of the terminal road. As matter of fact, I think I can say without fear of contradiction, that all the trunk lines operating their own lighterage equipment in this port have performed and are performing the service at a loss. I have been informed by one of the executive officials of one of our great railroads that the cost of operating their lighterage service has for a number of years exceeded 3¾ cents per 100 lbs. as against the 3 cents allowed for the service in the through rate. There are various causes for this, and an important one in my judgment that brings about such a condition is the very great length of our "free lighterage limits" and the large number of single carloads handled. Originally the lighterage limits were as follows: On the East River to 63rd street; on the Jersey Shore from Communipaw to Weehawken; on the Brooklyn shore to 39th street. These we considered very liberal limits, and as covering a large enough territory for free lighterage delivery, but the railroad companies, through competition and other causes, have kept on increasing these limits until now they deliver "lighterage free," single carloads on the New York side from Battery to 135th street; on the New Jersey side from National Storage Docks, Communipaw, to and including Edgewater, N. J.; on the East River, from the Battery to Jerome avenue bridge, Harlem river; on the Brooklyn side, from Astoria to Second bridge, in Newtown creek, and points in Wallabout canal, west to Washington avenue bridge, to Hamilton avenue bridge, Gowanus canal, and to 66th street, South Brooklyn, known as Bay Ridge. The free lighterage limits include delivery without extra charge, all single car-loads for delivery on the north and east shores of Staten Island between Port Richmond and Clifton and points on the New Jersey shore, of New York bay and the Kill von Kull between Constable Hook and Bayonne opposite Port Richmond, Staten Island. It is impossible for any trunk line to make an East river delivery beyond 42nd street of single carloads without actual loss in the handling of same. Where they have to make a delivery in the free lighterage limits in Harlem river of any single car it costs them more than twice as much to make such delivery as they receive in revenue for the service. This also applies on deliveries at Bay Ridge, Staten Island and Bayonne; the extra expense is caused by the extra time the lighter or barge takes to make such delivery at these long distances, by the delay in coming through bridges, waiting for draws to open to take boats through, the delay caused by bridges refusing to open between certain hours and the long towing of boats to these points of delivery. The number of single carloads which all the trunk lines as well as independent lighterage companies have for some years been compelled to deliver at long distances within free lighterage limits, have been at such an expense as to wipe entirely out any revenue that might be made on the handling of large lots, and at the end of each year they are compelled to face an actual loss for giving the shippers and consignees prompt and satisfactory handling. Another great hardship to which all railroad companies' equipments and independent companies are subjected is the detention of boats by shippers over the number of lay-days allowed under the rule, to receive the freight, and their disinclination to pay demurrage charges, to which the lighterman is justly entitled. This has always been a bone of contention, and it is because the trunk lines as well as the independent companies have lacked backbone to stand up for and demand that the rule be strictly enforced that the shippers now look upon the rule as obsolete. The cause of the failure of the railroad companies to force payment must be apparent to everyone. The shipper threatens that if the demurrage charge is enforced he will order his freight via another line. The fact is that competition for tonnage is so keen that each trunk line is afraid of some competitor getting the business, and they waive the demurrage in nearly all instances, so that the consignee and the steamship company's agents begin to look upon demurrage bills rendered by a railroad or lighterage company and rendered strictly under the rules of the port as a farce, and usually consign them to their waste paper baskets. It seems to me that the time is ripe for the railroads and independent lighterage companies to get together and insist on the demurrage rules being strictly lived up to and that the failure of any company to insist on payment of demurrage where it is justly due should be punished by the payment of a penalty to be fixed by such an agreement. There are many steamship companies that issue ocean permits calling for delivery of freight on a particular day and date, when they know that their inward cargo will not be unloaded from the steamer at that time, and that there is no possible chance of their being able to receive the

freight they have ordered alongside until two or three days subsequently. At the present time we are working under two sets of demurrage rules, one made by the New York Produce Exchange, which are the rules under which the independent companies work, and which have been in force since 1875, and one made about one year ago by the trunk lines. The railroad companies, without any solicitation on the part of either steamships or on the part of the consignees, as far as I have been able to find out, in a fit of liberality cut the price of demurrage almost in half on each class of craft. When I asked one of the members of the committee why this was done I was told that no demurrage bills were settled on the original basis anyway, and that when they did collect a bill it was always on the basis of 50 per cent., so that they thought it was just as well to make the standard rate of demurrage just about one-half of what it had been. This shows, in my judgment, weakness on the part of the trunk lines, to make such a reduction, for the reason that any demurrage bill that is justly due under the rule can be collected, and the steamship companies and consignees know they have no right to hold up a boat after a certain number of days without making themselves liable to the demurrage penalty and that anyone justly entitled to demurrage can collect it if they put the necessary screws on.

The increase in the last few years in the rate of wages, in the price of supplies, in the cost of material of construction and in maintaining floating equipment in proper condition has been very greatly increased without any increase whatever in the rate for lighterage service, so that if a lighter fails to receive prompt loading and discharge on every load it handles, which it must do to perform the service without loss, and unless consignees are compelled to pay for all detention after the time allowed under the rule, it is impossible to handle cargo at rate of 3 cents per 100 lbs., no matter what quantity you may get on the boat at one time for one delivery.

I agree with Mr. Grymes that we are subjected to a great many port charges at the port of New York to which consignees at other ports are not subjected, and, of course, it inures to the detriment of this port. There is a bill now before the Legislature to reduce our wharfage charges which should receive the hearty support of this Club and other bodies interested in commerce and navigation. Our present wharfage laws are very antiquated. They were enacted in 1846, when we were working under entirely different conditions. When the last charter commission met they took the entire old wharfage laws and placed them in the new statutes without the change of a single word. This wharfage question is an important one to the shipping community of New York.

Mr. Grymes spoke about delays at terminals. This is a subject for serious consideration, not only to all lightermen, but all steamship companies and all shippers. I do not know whether the very great delays to which lightermen are always subjected at different railroad terminals are due to bad management or to want of room, but I know there are many instances where half a dozen cars for one consignee intended for delivery to one steamer are drilled and unloaded upon half a dozen different piers at the same terminal, and consequently a great deal of time is lost by lighters being compelled to shift to all these piers in order to get full delivery of one consignment; thus great delays result, so that the lighterman is unable to comply with ocean steamship permit and the freight is shut out of the ocean steamer, the steamer leaves with dead room, the lighter is tied up, everybody kicks and no one places the blame where it properly belongs, namely, with the management of our terminals. It seems to me that our terminal managers ought to be able to arrange some system by which freight for each steamship company or consignees who are very large receivers could be drilled in and unloaded all on one pier, so that when the lighterman goes to load he can do so quickly and deliver his freight in time to comply with ocean permit and get his freight loaded in foreign steamers in ample time.

The rate of lighterage in New York harbor has never increased, but on the contrary has been from time to time, on a great many commodities, greatly reduced. Of course, this has been brought about by competition, and the large number of outside lighterage companies, in addition to the railroad lighterage equipment now doing business in the harbor. During the winter months, particularly this winter, which has so far been a very severe one, when towing has been most difficult, a condition due to the elements, and where the services of three or four tugs are necessary to perform the service of one boat under ordinary conditions on account of the great amount of ice, the towing long distances through the ice, and other causes, the equipment is compelled to undergo very heavy additional expense without being able to get any extra compensation from either the railroads or the consignees. This is a feature of the business which no one appreciates but the lighterman, who is the only sufferer. Now what is the remedy? The consolidation of all floating equipment. The day is coming when all the railroad companies and independent lighterage companies will be compelled to combine their entire fleet and floating equipment into one united terminal lighterage delivery company. If this is done the business can be handled without loss. At the present time, where every one is in competition, you will find the lighterage department of one trunk line having 15 boats in their fleet light and with no loads to put on them, and you will find one of their competitors with loads for 15 boats and no boats to load this cargo on; perhaps many of the deliveries will be for steamers that will have to sail on time—perhaps mail steamers, which must leave on schedule time. It seems to me that the combining of all the lighterage companies into one fleet and under one management would result in more prompt delivery, in a great saving of money now paid out for chartered boats for temporary relief in time of congestion of traffic; the management could place light boats promptly at whatever terminal they might be needed. There would be a large saving in labor, in coal and in supplies and repairs, and I have no doubt that the day will come when we shall have this consolidation effected.

"Square" Roundhouses.

In the United States, the term "roundhouse" and "engine house" are synonymous, for the reason that practically every engine house is circular. Mr. George P. Nichols, Chicago, gives the title at the head of this article to a paper read at the February meeting of the Western Railway Club, the purpose of which was to show the advantages of a rectangular engine house. The evident reason for the circular house is the turntable, and this form has doubtless continued to prevail because the turntable method is regarded as the one by which locomotives may be directed to their stalls with the greatest economy of labor. In advocating the rectangular design Mr. Nichols makes comparison between two 50-stall houses representing the two forms, and shown in Figs. 1 and 2.

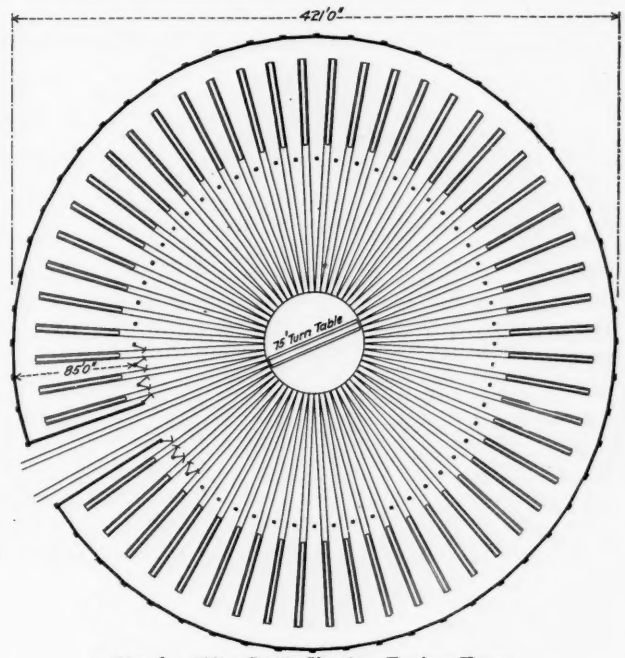


Fig. 1.—Fifty-Stall Circular Engine House.

The circular house, Fig. 1, has at the center a 75-ft. turntable, and between this and the inside wall a 90-ft. space, all exposed to the weather. In winter, after every snowstorm, the snow must be taken up and carried away and is a source of delay and expense. There are 100 single doors to the stalls, and with the continual moving of locomotives in and out some of the doors are open practically all of the time, making the building hard to heat. Also, the doors are continually getting out of order. The form of the stalls is such that valuable space must be sacrificed at the outer ends. Furthermore, the capacity of a circular house is reached when the circle is completed, and provision for additional motive power must be made by a new house, turntables, etc., with the possible disadvantage of lack of suitable space for locating it convenient to existing terminal facilities.

The rectangular house, Fig. 2, consists of four walls, with the enclosed space roofed over. A 70-ft. transfer table runs longitudinally through the center, with 25 stalls on each side, the stalls being rectangular and therefore economical of floor space. The ends of the stalls adjoin the end of the table, another saving of space. The entrance is at the middle of one side of the building, giving only one door, which may be of the steel roller type, not permissible with roundhouses because of their great expense. Being all under roofs, snow and rain cannot interfere with the handling of the engines. The house is also easily heated.

If an engine cannot enter the house under its own steam it can be drawn in by the winding-drum cable of the transfer table. The table has to travel only one-half the length of the house, at most, to place an engine in a stall and its speed can be made nearly equal to the speed of rotation of a turntable, enabling engines to be handled in practically the same time. In the matter of ground space there is a saving of about 50 per cent. in favor of the rectangular house. If it is necessary to provide space for additions to the motive power an extension of the house is all that is needed. This would involve taking down and rebuilding the end wall, extending the transfer-table pit and the side walls and building more pits. This form of house permits the use of a simple form of overhead traveling crane if desirable or necessary. Lighting arrangements and smoke-jacks would be the same as for the circular house.

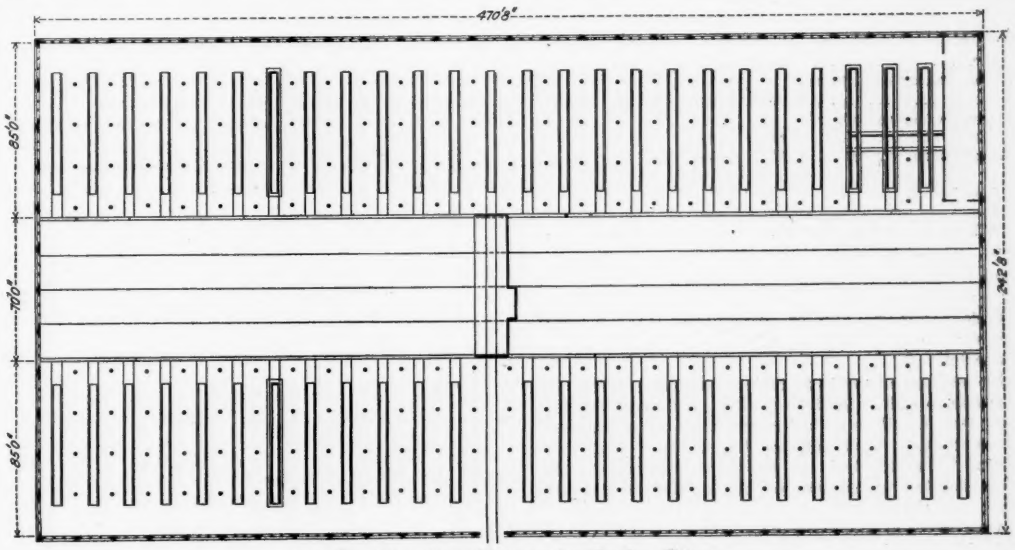


Fig. 2.—Fifty-Stall Rectangular Engine House.

In anticipation of the criticism that no means are provided in the design shown for turning an engine, the author explains that alternative methods for doing this would be a Y adjacent to the house, if conditions will permit, or the provision of a turntable outside. The idea of a combined transfer and turntable has occurred to him and appears feasible; the scheme being to place a rotating frame on a traveling base. A possible objection to such a device might be the increased depth of pit it would require. If a single entrance to the house is regarded as objectionable, as many as are desired can be provided.

Regarding the reliability of the electric transfer table compared with the turntable, the author, who is a designer of both, says that his experience has shown them to be equally efficient. A hand attachment could be placed on the transfer table as a matter of precaution, if desired; or, as an extra precaution, a second table could be placed in the same pit, though this would, of course, add considerably to the cost.

The speed of a transfer table, carrying a standard locomotive, can be between 125 and 250 f. p. m. Running empty or with light loads this speed can be doubled. One instance is mentioned where one of the largest tables built runs at 800 f. p. m.

Mention was made of the rectangular engine houses of the Terminal Railroad Association of St. Louis, referred to in the description of the terminal improvements in the *Railroad Gazette*, March 20, 1903.

The Paris underground railroad being about to order a large number of new cars and modify the construction of the old ones, a considerable movement was made in favor of providing smoking cars or compartments. The Health Commission was asked to report, and after inspection and analysis of the air in the cars it reported that there was already an excess of carbonic acid gas in the cars, and that smoking would certainly make things worse. The longest runs last but 20 minutes, and it seemed that the most inveterate smoker could abstain for that time.

Accident Bulletin No. 9.*

The Interstate Commerce Commission has issued Bulletin No. 9, showing its record of railroad accidents in the United States during the three months ending September 30, 1903. The number of persons killed in train accidents during the quarter was 280, and of injured 3,582. Accidents of other kinds bring the total number of casualties up to 15,187 (1,025 killed and 14,162 injured).

Table No. 1.—Casualties to Persons.

	Passengers.		Employees.	
	Kil'd.	Inj'd.	Kil'd.	Inj'd.
Collisions	50	1,172	108	998
Derailments	10	422	92	520
Miscellaneous train accidents (excluding the above), including locomotive-boiler explosions	..	74	20	396
Total train accidents	60	1,668	220	1,914
Coupling or uncoupling cars	..	..	70	912
While doing other work about trains or while attending switches	..	..	60	2,574
Coming in contact with overhead bridges, structures at side of track, etc.	2	13	33	315
Falling from cars or engines, or while getting on or off	40	485	214	2,421
Other causes	7	522	319	3,338
Total, not train accidents.	49	1,020	696	9,560
Total, all classes	109	2,688	916	11,474

The number of employees killed in train accidents in this quarter, 220, is about the same as in the corresponding quarter of the preceding year; but in the number of passengers thus killed, 60, there is a large increase. Thirty-seven passengers were killed in two collisions (record numbers 5 and 33 in the table of causes). The number of employees killed in coupling and uncoupling cars also continues large. The probable causes of the increase in this class of accidents, as compared with 1901-2, have been mentioned in preceding bulletins. The numbers killed have been—

Quarter ending—	
Sept. 30, 1902	52
Dec. 31, 1902	63
March 31, 1903	76
June 30, 1903	62
Sept. 30, 1903	70

Of the total in the table below, 251 collisions and 140 derailments affected passenger trains.

Table No. 2.—Collisions and Derailments.

	No.	Loss.	—Persons.— Kil'd.	Inj'd.
Collisions—				
Rear	486	$480,929	53	606
Butting	279	457,549	59	859
Trains separating	287	137,264	5	115
Miscellaneous	713	388,577	41	590
Total	1,765	1,464,319	158	2,170
Derailments due to—				
Defects of roadway, etc.	211	151,868	7	168
Defects of equipment	612	529,026	25	219
Negligence of trainmen, etc.	103	76,007	14	110
Unforeseen o b s truction, etc.	106	118,662	23	121
Malicious obstruction of track, etc.	13	20,019	1	33
Miscellaneous causes	253	224,447	32	291
Total	1,298	1,120,029	102	942
T'l col. and derail'ts	3,063	2,584,348	260	3,112

The double-column table of Class A train accidents includes all in which the damage is reported at $10,000 or over; notable cases in which passengers are killed and those doing damage less than $10,000 and down to $2,000, wherever the circumstances or the cause may be of particular interest.

One accident in the large table (the second) was a collision due to failure in block working, and one other (the tenth) was a collision which occurred on a line equipped with automatic block signals, but while a train was running "permissively." All the other collisions occurred where the block system was not in use. Two of them, the eighth and the twenty-fourth items in the list resulted, between them, in the death of 44 persons and the injury of 40. Item 24 is a pronounced illustration of how current errors of a conductor and an engineman may quickly produce disastrous results. Seventeen passengers and five employees and other persons were killed, in this case, in consequence of a lack of care in reading a telegraphic order on the part of the conductor, combined with the neglect on the part of the engineman of his plain duty to read the order himself and not trust to any other person's reading. On many railroads there is a rule requiring the conductor and the engineman, each, after reading a telegraphic order, to read it to an assistant (brakeman or fireman). This rule appears not to have been adopted on the road where this collision occurred.

Item 8, a collision killing 22 persons, appears to have been due to gross negligence of an engineman. The specific charge, in the report made by the railroad company, is that he failed to have his train charged with air; but it is further stated that on approaching the station where the preceding train was standing, and while still a mile off, he failed to see a fusee signal which had been displayed on the track to stop him, and did not shut off steam until warned by his fireman, who had seen the fusee. As the hour was about 3 o'clock in the morning, and as the engineman had not been sleeping during the time allowed him for rest in the preceding day, there is strong ground for the inference that he was asleep at his post. On being aroused by his fireman, this engineman sounded the whistle as a signal for the application of hand brakes; but it appears that the cars of the train, most of them platform cars fitted for carrying large wagons, had no brake wheels in position by which the brakes could be put on by hand. The safety of the train, therefore, so far as the means of stopping it was concerned, depended wholly on the power brake; and this failed by reason of the negligence of the engineman. The air-brake apparatus was found to be in perfect order after the collision, and it was in good working order when the train began its trip before the collision.

The engineman who was at fault in this case had been running this engine only about 10 days. He had been in the service of the company about 18 months. The officers of the road believe that after the last stop was made before the collision (about one hour before) the engineman put his air-brake valve in such a position as to shut off the flow of air from the main reservoir to the pipe leading through the train; and with the supply thus cut off, the air would slowly leak from the train pipe, making the brakes inoperative.

Item 25 (Record No. 48, a derailment) is the fourth disaster to a "fast mail" train which the records have disclosed recently. In one of these cases the superintendent's report specifically states that reckless speed was one of the causes; the circumstances, as given, tend to support the conclusion that in the other three it was the sole cause.

The 29th accident, a butting collision, disastrous both to persons and to property, affords an illustration of the need of reading all telegraphic orders aloud, in the presence of two or more persons, if the orders are to be depended upon for the safety of life and limb.

This case differs from Item 24 in that there was no requirement that the order should be read aloud in the presence of the telegraph operator, or be signed for. The rule requiring these safeguards was relaxed, as is customary, because the order did not restrict the rights of the train to which it was sent; that is to say, it permitted this train to go farther than it would have gone if the order had not been issued. But it permitted it to go farther only as against a certain opposing train; and the reading into the order of the name or designation of another train, of which the despatcher issuing the order had no thought, had the effect, of course, of nullifying all the calculations of the despatcher and of the men in charge of the opposing train or trains.

CAUSES OF TWENTY-NINE PROMINENT TRAIN ACCIDENTS (CLASS A).

[Note.—R. stands for rear collision; B., butting collision; M., miscellaneous collisions; D., derailment; P., passenger train; F., freight and miscellaneous trains.]

Item.	Record No.	Class.	Kind of train.	Killed.	Injured.	Damage to engines, cars and roadway.	Cause.
1	22	R.	P. and F.	2	4	$1,530	Freight detained at station; inexperienced flagman went back with signal; returned to a point near caboose and went to sleep on track. Engineman and fireman of approaching train might have seen tail lights of freight 2 miles away.
2	21	R.	P. and P.	1	20	2,000	Clear block signal given while the preceding train was still in block section. Signalman 20 years old.
3	13	D.	P.	2	2	5,200	Passenger train, running 60 miles an hour, overran home and distant signal at crossing; engineman and fireman killed.
4	8	M.	P. and P.	1	14	5,513	Collision at crossing; unsettled dispute between the roads as to responsibility.
5	6	B.	F. and F.	1	3	5,745	Engineman fell asleep; fireman unfamiliar with road.
6	3	B.	P. and F.	1	4	5,875	Passenger train ran 8 minutes ahead of time. Conductor and engineman said to have good records.
7	43	D.	F.	2	1	6,100	Train became uncontrollable on steep descending grade; brakes inspected at summit and found satisfactory; track was wet. Trainmen reported as not chargeable with misconduct.
8	33	R.	F. and F.	22	15	6,200	3 a. m. Two trains carrying circus; engineman failed to keep air-brakes charged with proper pressure. (See further explanation in text.)
9	41	D.	P.	2	1	6,500	Excessive speed on curve of 7° 24′; outer rail elevated 7¾ in. No passengers on train.
10	63	R.	F. and F.	0	0	6,800	The engineman neglected to observe caution card delivered to him, and disregarded automatic block signal.
11	31	B.	F. and F.	0	2	7,566	Operator failed to deliver telegraphic order; operator in service at this place 7 days; other places 2 years; age, 23.
12	59	M.	F. and F.	1	2	8,700	Collision at crossing; 4 a. m.; signal set at "stop," but did not show red; defective counter-weight.
13	68	B.	F. and F.	0	3	10,000	Despatcher sent telegraphic order reading 5:20 p. m. Operator copied it 5:30; despatcher claims that when the order was repeated this error was corrected, but this the operator denies.
14	51	D.	F.	0	0	10,226	Brake-beam dropped.
15	2	B.	P. and P.	1	129	10,480	Improper flagging by eastbound train. Conductor, brakeman, engineman and fireman dismissed for negligence.
16	23	R	F. and F.	0	0	10,500	Improper flagging; brakeman returned to his caboose and was killed; 22 years old; 8 months' experience.
17	54	D.	P.	4	27	10,500	Front truck wheel of engine broke.
18	73	B.	F. and F.	0	5	10,500	Train while waiting on side track lost right to road by becoming 12 hours late; conductor and engineman started out, forgetting this limitation.
19	52	D.	F.	0	0	12,000	Broken flange.
20	34	D.	P.	0	5	12,313	10 p. m. Bridge washed out by flood caused by "waterspout." Flood five times greater than capacity of waterway beneath track.
21	46	D	P.	3	2	13,000	Washout.
22	9	M.	P. and F.	1	3	13,700	Work train on 4½ per cent. grade became uncontrollable and ran into the side of passenger train.
23	18	D.	F.	0	1	15,000	Train became uncontrollable on steep grade; engineman "lost his air."
24	5	B.	P. and F.	22	25	16,896	Conductor of freight misread telegraphic order; it read 20 minutes; he read it 1 hour and 20 minutes. Engineman took conductor's word and did not read order.
25	48	D.	Mail	5	0	18,100	Entire crew (all the persons on the train) killed. Too high speed on curve. Train fell 75 ft. Engineman not long in the service of this road, but knew the line and had had experience elsewhere.
26	29	B.	F. and F.	4	4	18,109	Operator made mistake in copying telegraphic order. Despatcher failed to discover error on repetition; two enginemen disregarded automatic block signal.
27	64	R.	F. and F.	1	2	20,000	Careless running.
28	1	B.	P. and P.	0	1	30,600	Conductor and engineman westbound misread telegraphic order.
29	4	B.	P. and F.	4	60	33,770	Conductor and engineman of one train misread orders. They had a "19" order against "Second No. 1," but read it "No. 1;" engineman was killed. Being on Form 19 the order was not read by the operator to the conductor and engineman.
			Total	80	335	$333,423	

*The *Railroad Gazette* accident records for July, August and September will be found by referring to pages 619, 691 and 761 of last year. Below is a list of the principal accidents in these three months, as shown in our record. To the items in this list we have appended the number of the corresponding item in the list of causes in the Government Bulletin, so far as we are able to identify the accidents. The column-heading *A* refers to *Railroad Gazette* figures and *B* to Government figures.

Prominent Accidents in Railroad Gazette Records.

	Kil'd. A	Kil'd. B	Inj. A	Inj. B	Item No.
July 7—Rockfish, Va.	23	22	6	25	24
July 26—Vlasaty, Minn.	4	4	25	60	29
Aug. 1—Greenwood, Ky.	5	4	3	4	26
Aug. 7—Durand, Mich.	23	22	30	15	8
Aug. 23—Little Falls, N. Y.	2	2	2	1	9
Aug. 24—Bloomington, Ill.	0	..	44	..	..
Aug. 29—Turners, N. Y.	1	1	17	20	2
Sept. 27—Danville, Va.	9	5	7	0	25

The Government Bulletins for preceding quarters have been published in the *Railroad Gazette* as follows:

No. 8, page 828, 1903.	No. 4, page 833, 1902.
No. 7, page 557, 1903.	No. 3, page 607, 1902.
No. 6, page 325, 1903.	No. 2, page 508, 1902.
No. 5, page 67, 1903.	No. 1, page 309, 1902.

Steel Castings.

BY C. W. GENNET, JR.

Within the past decade the demand for a hard, tough metal capable of resisting shock, and at the same time possessing good wearing qualities and the ability to be easily machined, has given rise to a general use of steel castings in place of cast and wrought iron, for engine frames, driving wheel centers, driving boxes, links, equalizers, foot-plates and the various small shapes which have heretofore been either forged or made of an undesirable brittle metal. The car builder has introduced cast steel for bolsters, couplers, center-plates and side-bearings.

The characteristics of cast steel are not generally well known and for that reason it is often regarded as unsatisfactory. An article made of cast steel may be condemned because it exhibits a small blow hole; several tons of castings may be rejected because the tensile test specimen representing them shows an elongation a trifle less than that specified; or even castings may be required to be annealed, when, as a matter of fact, the action can produce an effect exactly opposite to what is wanted. In view of such conditions, it is hoped that this summary may correct false impressions and lead to a more careful study of the material and its adaptations.

Cast steel, as the name implies, is the direct result of casting steel when the metal is in the fluid condition. Strictly speaking, it differs from the ordinary steel used for boiler and fire-box plates or for structural purposes only in that it is not rolled. Chemically, the ordinary heat of cast steel would be entirely acceptable for boiler or fire-box plates; it is made by an identical process and is handled much in the same way. If then the steel can be brought to such a state of fluidity that it can be poured in a mould and left to solidify the result is an adaptation of the metal which precludes the necessity of later rolling, hammering and assembling several pieces of it into the

desired shape for the finished article, and still it possesses the fundamental properties of steel.

Cast steel is generally made in an open hearth furnace having a capacity of from 10 tons or more. Within the last few years cast steel made by the Tropenas process has met with fair success, particularly in the making of small castings. Commercially this process has been largely unsuccessful, for the reason that the action, which takes place in a converter differing from the Bessemer only in the arrangement of the tuyeres, requires such a short time to complete the making of several tons of steel that except in unusual cases the apparatus must remain idle for some time while the moulds are being made. Steel made by the Bessemer process is not considered desirable for the making of steel castings; commercially, for a reason involving the cost of operation much like the above, and technically, because of its possible sponginess and the disadvantages which prevent its use where uniformity is wanted. The acid open hearth process is generally used, although the basic process is frequently used and in many instances gives results which are preferable. The process is generally governed by the condition of the scrap, for a steel high in phosphorus is wholly undesirable, particularly in a casting subject to sudden shock or strain.

Eastern makers agree that dry sand moulds are the best, and to that end they make nearly all castings in moulds which have been baked in an oven until they are hard and brittle. This makes a mould practically free from the minute air spaces which exist around the particles of sand in the ordinary green sand mould. Thus upon pouring the metal, the air finds exit only through the vents purposely left, and there is little chance for the metal to eat into the mould and causing roughness. There is an absence of moisture also, which becomes gaseous in a green sand mould, and frequently causes in a casting of this type numerous small blow holes, both on the surface and in the interior. On the other hand western makers claim that green sand moulds are good, and particularly if they are skin dried, by covering the surface of the mould with some light oil and allowing it to become surface baked by firing the oil. The governing feature which distinguishes the two classes of moulds seems to be a quality of sand which is procurable in the west at such prices as to allow of its common use, while the transportation expenses are sufficient to deprive the eastern makers of its use, even though the saving in the cost of baking and rehandling the moulds be considered. This sand has for its chief characteristic a peculiar shaped crystal, and it contains a high proportion of aluminum, which, it is claimed, gives a smooth, clean surface and a sound casting. A maker, who has tried both methods of making moulds, has discarded the green sand system entirely on account of his inability to get sound castings with its use, while at the same time, green sand castings made in the west from the identical sand, give results which are highly satisfactory.

In the making of any steel casting it is necessary that it have attached to it a mass of the metal called a sink-head or riser. According to the size of the article being made, there may be several of these attached and of relatively large proportions, their function being to remain liquid in their interior and to supply metal to the casting as it shrinks and solidifies. When these are later cut off their interior may be found spongy or hollow, and this appearance can be taken as good proof that their duty has been satisfactorily performed, and any blow holes on the surface of the casting which appear where these risers are cut off are purely local, and do not extend far below the surface.

Blow holes, honey-combs, shrink-cracks, pin holes and the like are the chief sources of trouble in the foundry. As has been stated they may result from the character of the mould or from sink-heads of improper size, and in the case of shrink cracks, from bad design. They are also the result of the treatment during the process of making, the tapping-off temperature of the metal and the temperature at which it is poured. It has been found that silicon, manganese and aluminum are the chemical antidotes for unsound castings. Up to a certain point, which experience alone can govern, the addition of these elements to the steel is regarded as beneficial, but a poor metal results when the steel is overdosed with them, for high silicon decreases its toughness, manganese its brittleness and aluminum its ductility.

Campbell says with reference to specifications for steel castings that chemically "the most important part is to state that phosphorus shall not exceed .04 per cent.," and he adds that "phosphorus, although influencing to some extent the ordinary testing history, is often masked by other factors, and manifests itself only at a later time in that brittleness under shock which is its inherent characteristic," and to which a casting is more frequently subjected to than a steady pull. Sulphur usually affects the cold casting but little, and copper has practically no influence. The carbon element is varied according to the tensile strength desired. More than .50 per cent. will render the casting very hard for ordinary machine finishing.

After the casting is made and after it is cool, it may contain, especially if of a somewhat intricate design, various internal strains. That is, one portion may be held rigidly in tension by reason of its cooling faster than another portion which will be in compression. One blow from a sledge hammer is often sufficient to break into several pieces a driving wheel center when it is taken from a mould after cooling. Primarily to relieve the casting from these internal strains it has generally been regarded as necessary to anneal them. So the castings were put into a furnace in any haphazard way, heated up to redness and left to cool. This for some reason was, and even now is, the customary method of annealing.

It is often remarked of steel castings which fail in service, from the appearance of the fracture that they have not been annealed, for the fact that annealing changes the character of the fracture has long been known. If the fracture of an unannealed steel casting is examined under the microscope, it will be found to show large course crystals significant of brittleness and little ductility. During the last few years great advances have been made in the subject of annealing, and it is no longer the assumption that the reckless heating of a steel casting to a cherry heat and its subsequent cooling is the proper treatment. One important feature of annealing is to afford relief from internal strains; but a heat treatment which will produce a fixed change in the structure of the metal and give it properties which originally it did not have is important. The desirable feature to give toughness along with ductility to the metal is the characteristic fine grained microstructure, which results from heat treatment. The object of annealing is to change the original coarse crystals into a fine structure which gives the best condition for ductility and toughness, and at the same time possessing the maximum hardness for the particular composition of the steel used. Included in this change, which is brought about by slow heating and cooling, there must be, of course, a relief from internal strains, and thus the two objects are combined in a single operation.

But the process is less easy than at first appears, for it is dependent upon the critical point of the steel, that is the temperature at which a change in the micro-structure takes place. Experiments have shown that there are probably three points at which steel undergoes this sudden change of character, and that these points are influenced by the percentage of carbon in the steel and to some extent by such other ingredients as phosphorus and manganese. It is claimed that in steels of over .30 per cent. carbon these three critical points are practically coincident, but, as the usual steel castings contain something less than this amount, the problem becomes much more complicated. Further consideration of this subject involves such a study of micro-metallography as to become quite appalling to the reader, and it seems sufficient to thus simply attract attention to the importance of the matter on which annealing is based.

Few concerns give the proper attention to annealing; and largely, for this reason, the use of steel castings becomes a source of some vexation. Obviously the article can be over-annealed or under-annealed, more frequently, perhaps, the latter. Either result is, of course, detrimental in a general way to the article, for either it is entirely spoiled by being made hard, coarse and brittle, as in over-annealing, or else only a part of the desired result is accomplished, viz., the possible relief from internal strains. Furnaces for annealing are moderately large, and it is quite impossible to heat the contents to the uniformly required temperature. Certainly the thin tapering spokes of a driving wheel center will attain the correct degree before the heavy mass forming its hub, or even a driving-box, which may be adjacent to the wheel center in the furnace. Consequently the one will suffer for the other.

Some specifications recklessly demand that all steel castings shall be annealed, and such is, doubtless, not only an unnecessary feature, but one likely to cause trouble. If the casting is of such a design as to render it free from strain, then it would seem undesirable to subject it to a questionable process, which may make it hard and brittle and unfit for use.

The effect that annealing has on the physical properties of the metal as shown by a test machine is, to some extent, an unsettled question and would seem to depend somewhat upon the success of the operation in every detail. Unquestionably annealing increases the per cents of elongation and reduction of area. Contrary to the prevalent idea, experiments seem to indicate that annealing conducted in a proper and scientific manner slightly raises the tensile strength. This is in accordance, also, with the theory upon which the annealing of steel castings is based. The results in the appended table illustrate this fact, and are of interest as serving to show the range of values that may be obtained by testing steel castings of even the same identity. They were obtained by taking three risers or sink-heads which had been attached to the same casting and are shown in the table by the tests numbered 1, 2 and 3. The risers were slotted and half of each one annealed. Two adjacent test pieces from each of the six specimens were then cut out, and tested by usual methods. Some of the values would appear to be extreme, but these are probably due to some local defects which unfortunately were not noted at the time of making the tests. To the eye, the character of the fracture is changed from crystalline to what frequently approaches silky or amorphous.

RESULTS OF TESTS ON ANNEALED AND UNANNEALED STEEL CASTINGS.

	Unannealed.						Annealed.						Average	
													Unannealed.	Annealed.
No. of test.....	1		2		3		1		2		3		....	....
Diameter of test piece	.475	.505	.485	.505	.475	.503	.482	.504	.475	.504	.475	.503	....	....
Tensile strength, per sq. in....	67,720	69,950	66,600	71,920	71,960	70,460	68,500	69,690	72,240	71,160	72,910	69,960	69,768	70,743
Per cent. elongation in 2 in..	18.0	20.0	20.0	21.0	23.0	22.0	27.0	23.0	19.0	30.0	21.0	27.0	20.6	24.5
Per cent. reduction area	29.0	20.6	32.0	20.6	25.5	27.0	42.7	37.0	19.9	40.3	21.8	27.0	25.7	31.4

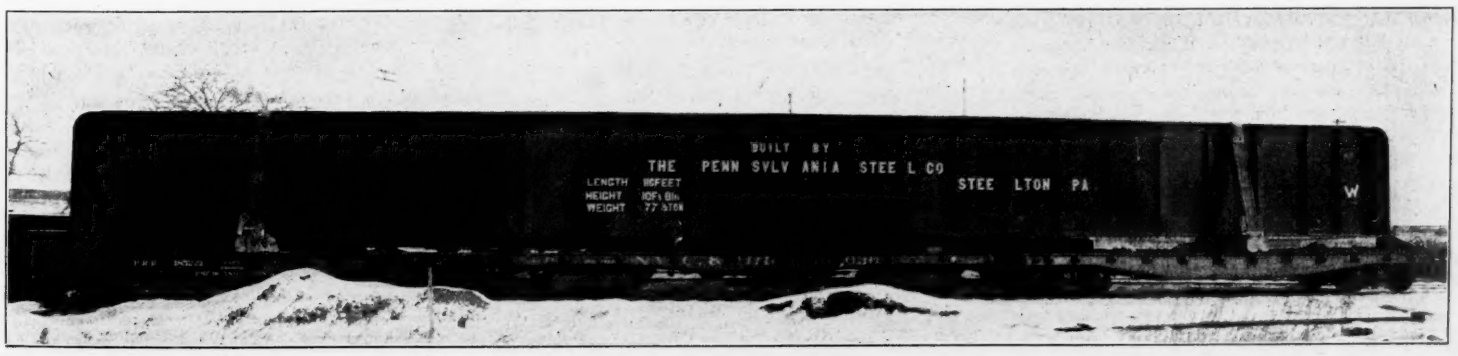
Chemical analysis: C = .27; P = .046; Mn = .560; S = .030; Si = .250.

Physical tests are usually made from at least two coupons attached to various castings of a heat of the metal. The position on the castings of these coupons doubtless governs their ability to successfully represent the exact condition, for if they are on the top of the articles cast they are much more liable to possess the weaker qualities of the metal. They should also represent the final state of the castings as near as possible, so that if the castings are to be annealed the coupons should be left attached and allowed to undergo the treatment, after which they can be cut off and turned to the desired size for testing. When thus annealed, test pieces will, no doubt, fail to represent the lot correctly, for their small mass will cool either slower or faster than the casting.

The correct metal for steel castings will be tough and tenacious, ductile and as hard as may be required. Pieces of it can be bent sometimes nearly double without showing cracks and recent experience has shown that it can be welded quite as well as rolled steel.

Large Girder for the West Shore.

The accompanying photograph shows a 116-ft. girder recently built by the Pennsylvania Steel Company for the New York Central & Hudson River, West Shore branch, bridge 454, located near Jordan, N. Y. It is the center girder of a double-track through plate girder skew bridge, and was riveted up complete and loaded on cars in the shop. The Pennsylvania Steel Company believes it is one of the heaviest single girders that has ever been finished complete in a shop.



116 ft. Girder for the West Shore.

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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Toward the building of the Panama Canal by the Federal Government a further step and a final assurance is given by the ratification this week by the United States Senate of the treaty with Panama. The vital element in its construction without scandal and loss, the selection of the men who are to control it, is now being considered, and happily those suggested by the President give assurance to engineers that the commission will include men preeminently qualified for guiding the largest engineering undertaking of this age. It is of high importance to our National reputation that all the members of this commission should be spotless and that each member should bring a distinct contribution to the assembled wisdom. It has been the plain duty of those who have had specific valuable information concerning those suggested by the President to convey it to him in the proper way. It is probable that he so openly made the tentative selections for this purpose.

Mr. Balliet's paper in another column on the behavior of automatic block signals in severe weather is a valuable supplement to the statements of fact on the same subject which appeared in the issue of January 29; but it is more than a mere supplement, for his wide acquaintance gives him much information that we did not get, while his long experience with the signals on nearly 500 miles of road qualifies him as one of the best judges in this field. In no field is the pursuit of absolute perfection more fascinating than in that of automatic block signaling, in none is there a more definite need of perfection, and probably in no art so young as this can so large a proportion of diligent students be found. At the same time the relation between cause and effect is subtile, and the varying conditions of heat and cold, of dryness and moisture; the different qualities of wood and iron, of this and that chemical, demand the patient study of every one who has to do with electric signals, and give Mr. Balliet's article special value.

Squared roundhouses while not unknown in America, are unusual. The circular or polygonal form is nearly universal, although it has a number of serious disadvantages to offset in part its peculiar advantages. Some of these are enumerated in the paper by Mr. George P. Nichols in another column. This paper proposes the rectangular shape with an electrically-operated transfer table, thus getting economy of room, and ease in heating and protecting from the weather. The cost of a circular house was recently said to be $2,500 to $2,600 per stall. A rough estimate for the rectangular house works out about $1,800 a stall. If the engines are turned on a Y the added cost per stall would not affect greatly the figure given; but if a power driven turntable is used there is an additional cost of something like $100 a stall on a 50-stall house. The rapidity of handling engines by transfer and turntable is said to be quite alike, but from a consideration of all of the conditions this does not appear to be true. The average distance traveled per locomotive by the transfer table is unquestionably greater than for the turntable. The extreme movement that a turntable should make, if properly handled, is one-half of a revolution, and taking not over a minute and a half. If the table must be placed, another half minute will be needed, making two minutes total. The greatest possible movement of the transfer table would be twice the length of the pit—over 900 ft. in the plan shown. Assuming the maximum speeds given by Mr. Nichols for full load and no load, the transfer table would take close to three minutes per locomotive or approximately 50 per cent. more time than the turntable. It does not seem unfair to assume that the average times per engine for both methods would bear about this same relation. However, under the actual working conditions of the majority of houses the transfer table could easily take care of all locomotive movements. An advantage which it has over the turntable is that the locomotive does not need to be balanced, which offsets, in part, the difference in average time of movement. In European practice the rectangular house is generally used, having remained the preferred type from the first. In this country a good example of this form of house, which will handle a large number of locomotives daily, will soon be in service in St. Louis, and the results from its use may affect future practice.

The Contest for Grain.

The latest announcement by the Philadelphia railroads proclaims a reduction in ex-lake grain rates to the basis of 2.2 cents for wheat, to become effective Feb. 26, following 2.6 cents, Feb. 19; 3.4 cents Feb. 16, and 5 cents, Feb. 1. This most recent move in the fight for a differential in favor of Philadelphia gives a rate considerably lower than has ever before been made between Buffalo and the Atlantic ports, but it will doubtless be met by the New York roads, whose announcement has not yet been made. The spectacular quarrel between New York and Philadelphia in the attempt of the latter to insist on the observance of a differential which has really never existed, can be carried on at present without any real financial loss, in the absence of any considerable grain movement. But in view of the increasing diversion of grain from New York to the Gulf and to Canadian ports, New York interests are extremely sensitive to any move which favors a rival port, and regard the present struggle as a fight for a principle which is quite unfair to them. The difficulty is heightened by the fact that the present era of large ships coincides with the efforts of the active ports north, south and west to make the most of their geographical advantages. The modern steamship of the "Cedric" type carries as much freight as the combined cargoes of three or four vessels, even as recently as ten years ago; it can be worked with very great economy if the freight is forthcoming, but eats its head off when compelled to make its schedule trips loaded only to a small proportion of its capacity. The situation, then, is that the cargo capacity of the ocean carriers from New York has increased enormously in the last five yars, while freight suitable for ballast offering at the port has increased very little, relatively.

The Philadelphia differential war is only a single incident in the contest for grain. Starting with the opening of the new Chicago-Omaha line by the Chicago Great Western, this road has made a series of sensational cuts to secure business by bringing Omaha into prominence as a market. Meantime, the Atchison has been making radical efforts to move grain direct to Galveston from interior Kansas points, cutting out Kansas City as a basing point. As against a normal rate of 17 cents per 100 lbs. for export wheat from Kansas City to Gulf ports, a rate of 12 cents was in effect Feb. 16; from the Missouri River to Chicago the rate was 10 cents, as against 14 cents, normal; from the Missouri River to lower Atlantic ports, 15 cents, while from Omaha to Chicago the Chicago Great Western quoted 8 cents, as against 14 cents, normal.

So far as the actual movement of grain is concerned, reports of the total exports of wheat for the last seven months, in the face of only a fair sized crop and increased domestic consumption, show a decrease from 83,112,135 bushels, for the same period last year, to 39,148,753 bushels. Of this total, New York received 3,327,975 bushels; Baltimore, 2,624,923 bushels; Boston about the same, and Philadelphia, 944,218. All of these ports showed a marked decrease from the same period last year. Galveston, however, received 15,482,211 bushels, as compared with 11,030,987 during the seven months ending with January, 1903; well over a third of the total for the country, while New Orleans takes second place, with 6,112,990 bushels, as compared with 12,347,925 for the same period a year ago.

It looks as if a considerable change in the basis of export rates on grain and probably on other commodities would have to take place before all the loose ends of the present situation are accounted for, and as if such a change would benefit still further the Gulf ports. The steamship men at New York have good reason to consider the situation grave; if the new barge canal is going to find enough grain cargoes for their large vessels, it will have to be a very active barge canal.

Prices for Repairs to Steel Cars.

The report of the Committee on Repairs to Steel Cars, which is to be presented at the convention of the Master Car Builders' Association in June, will doubtless have a vigorous discussion among the members. From the list of questions in a circular of inquiry by the committee, it is evident that all phases of the subject will be taken under advisement and some definite action of the Association looking to the adoption of a fixed scale of prices for repairs of steel cars should come from the thorough investigation. There is need for such concerted action by the members of the Association because it is plain that the present prices for repairs to wooden cars given in the Rules for Interchange, cannot be used in billing repairs on steel cars, nor do the combinations of defects indicating unfair usage altogether apply. So long as steel cars were used by a few roads, and for minerals only, it was possible to arrange mutual agreements covering the rather infrequent cases of repairs to cars damaged on foreign roads, or to arrange to have the cars routed home for repairs. Since the larger adoption and promiscuous interchange of all-steel and steel underframe cars has come about, much confusion and delay has arisen from the misunderstandings in appraising damages and making settlements. The only betterment of this condition is the adoption of a scale of prices mutually agreed upon by all the roads to be used as a basis for rendering bills. The committee is trying to make such a scale.

The charge for labor and the basis on which such charges shall be made need overhauling. When the present scale of prices for repairs to wooden cars was made up, the labor charge of 20 cents an hour was used in estimating the specific costs for certain classes of repairs. This was a fair rate when it was made and it still represents closely the average wage of car repairers in all parts of the country whether they be working at piece rate or day rate. But this rate is far from the wages of men who repair steel cars. It is only on the roads which own and handle large numbers of steel cars, that an efficient force of car repairers working at the prevailing rate for wooden car repairers, has been trained to do the special work of repairing such equipment. On the other roads high priced boiler makers do this work and the cost is high. Lack of proper tools and equipment increases it, for in many places all pieces to be straightened or spliced are taken into the smith and boiler shops at the expense of other work properly being done there. A credit of only 20 cents an hour for labor is onerous to such roads while a higher charge of, say, 30 cents, would probably be a too profitable rate for roads which have the equipment and working force to repair steel cars in large numbers in an economical way. A fair method for determining the labor charge would seem to be to obtain the average prevailing rate in the following manner. Assume that road A owns 2,000 cars and pays 20 cents an hour; road B owns 1,000 cars and pays 25 cents; road C owns 500 cars and pays 30 cents. Multiply the number of cars owned by the rate paid per hour by each road and divide the sum of these products by the total number of cars. This gives an average rate of 23 cents, based on the proportion of the

number of cars owned by each road to the total number of cars.

This seems to be a theoretically correct way of finding the just charge, so that the total amount paid by owners may equal the total cost to the users, although users with economical equipment for repairs would be gainers and those less economically equipped would be losers. An "average" is rarely true when applied to any specific case.

Having arrived at a basic labor charge, the fixing of the specific charges for certain common repairs becomes largely a matter of observation of the time necessary to do the work in each case. There is little to choose between the two systems of making out bills, on the fixed charge or on the charge per rivet removed and replaced. In those shops where the piece rate system is in use, it is usually based on a fixed price for each kind of repairs made. Rendering bills for repairs to other roads in the same basis would probably simplify the shop cost records. The other method, however, of arriving at the cost of repairs on the basis of number of rivets removed and replaced is perhaps a more equitable one since it allows to some extent for differences in the construction of cars and depends on a unit charge which can be determined with reasonable accuracy by observation; it also permits of the ready calculation of cost of repairs for any combination of damage which might not be specifically stated in a set of rules.

One important point which the committee has not touched in its circular of inquiry is the credit for scrap and the charge for second-hand material applied. This is of more moment in the case of repairs to steel cars than for wooden cars inasmuch as bent and broken parts can be straightened and spliced or patched and put in serviceable condition in almost every case. Practice differs widely in different shops and there is left open a fine field for contention over improper repairs unless some definite rule is adopted covering the replacement of parts with second-hand material. Take the case of a road which does not approve of cutting off and splicing bent or broken center sills, but insists on cutting out the damaged members entire and replacing them with new sills. One of its cars is damaged in collision and goes for repairs to a shop where it is the usual practice to splice center sills. Repairs are made and the car routed home with spliced sills, being in perfect condition in the opinion of the user. The owner's claim of improper repairs is not allowed by the user and contention ensues. Again, where a shop repairs a large number of steel cars it is not practicable to wait on the furnace men to straighten bent parts removed and then replace these identical parts on the car. Instead, a large stock of repaired second-hand parts is kept on hand to draw from. A slightly damaged piece may be removed and replaced with a patched or spliced piece. Are such repairs improper ones? These are only instances of the many such misunderstandings which may occur and which should be covered by some agreement.

Uneconomical Use of Block Signals.

In his opening address at the annual meeting of the Railway Signal Association, Mr. Hope, the retiring President of the Association, proposed as the chief subject for discussion the "Protection of trains at stations without delaying the approach of other trains." This is significant, and indicates a growing appreciation of the benefits to be derived from the block system. On most single track roads the time interval and flagging system was at first done away with to prevent collisions on the open road; but those who took this action soon found by experience that the remedy for that evil was equally applicable to the prevention of collisions at stations, and everywhere; also that it may bring in a far more tangible benefit, an increase in the capacity of the road.

Mr. Hope's road, the Chicago, St. Paul, Minneapolis & Omaha, is for most of its length a typical trunk single-track line, not enjoying the highest single-track earnings, yet carrying an important passenger traffic. Its officers, therefore, rightly aim to follow high standards of safety, although they do not feel able to put in as many signals as they want and need. In such a situation the result is a compromise, the "telegraph block system" in its simplest —or rather its most incomplete—form. There is a like condition now on many hundreds of miles of single-track railroads. The switches are not interlocked, the block signals are not in the most suitable location, and provisions for high speed in thick weather are generally lacking. Nevertheless, it is a block system, and, in the circumstances, the establishment of such an improvement is commendable, for it is an improvement and leads to further progress.

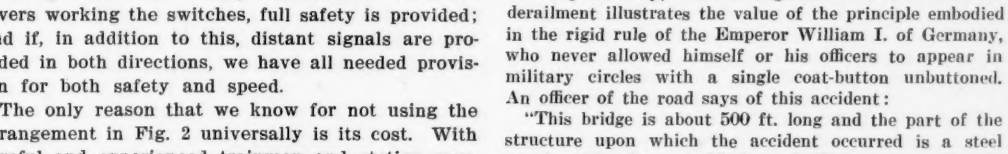


Fig. 2.—Home and Starting Signals at Each Station.

The problem is to get from the arrangement shown in the accompanying sketch, Fig. 1, the same results as are to be had from that in Fig. 2, without going to the expense of providing the additional signals shown in Fig. 2. It cannot be done. The arrangement shown in Fig. 1 will provide only for the easiest traffic. With stations 5 miles apart and trains 10 miles apart; and none of them having work to do at stations, the arrangement is practicable, provided switches are never left wrong. But if trains are close together there is a temptation to let the second train pass a little beyond the signal at A before the first has passed completely beyond the signal at B. This is done, no doubt, many times every day; but it is defective block signaling. It involves partial dependence on hand motions or oral signals, and these introduce an element of uncertainty. If an eastbound freight train (A to B) thus breaks the rule at A, to enter the side track at P E, (to avoid delaying a following passenger train), it will probably break it again by going out of the side track at O E on an oral or hand motion signal. If a train is doing switching at either switch, P or P E (station B) and the operator at B allows a following train to come on from A, that is not block signaling, but is more properly described as movement by written or unwritten telegraphic orders; for his own signal is not in the right location to fully protect the switching train. If any train, at either station, should move off and leave a switch wrong, the signal would only partly protect trains against the wrong switch; it would warn trains from but one direction; but this warning, as we have just seen, is weakened by the regularly permitted practice of running the front ends of trains some distance past a signal before obeying its indication to stop.

By providing two signals at each station, as in Fig. 2, those objectionable conditions are eliminated. If the practice has been of the kind just described, the additional signal adds greatly to the safety; while if the practice has been strict (keeping trains farther apart), the improvement doubles the capacity of the road; for each short section (as for example Ah to As) is as useful, measuring by the time it is occupied, as one of the long ones (from A to B). That is to say, a stopping-train spends as much time between Ah and As, as between As and Bh, although section Ah-As is very short as compared with As-Bh.

If, with the signals fixed as in Fig. 2, the levers working them are suitably interlocked with the levers working the switches, full safety is provided; and if, in addition to this, distant signals are provided in both directions, we have all needed provision for both safety and speed.

The only reason that we know for not using the arrangement in Fig. 2 universally is its cost. With careful and experienced trainmen and station men, the cheaper arrangement may work for years with satisfactory results. With an irregular traffic, or freight congestions, or scarcity of good men, necessitating the employment in responsible positions of inexperienced trainmen or enginemen, there is a constant risk. So we have the problem of balancing a known expense of $100 to $500 per station for signals, against a risk which can be measured only vaguely; and the resultant, if it could be determined, would be modified by the probable effect on the feelings of the superintendent, and the effect on the reputation of the company, of killing a passenger now and then.

The original question, therefore, comes pretty nearly being answered by a reply which has been made several times, in Signal Club discussions, to other questions on the relation of signals to safety. If a railroad will pay the money the signal engineer can quickly provide the needed signals; and signal engineers are now measurably well agreed as to how much money is required for any specified protection of trains. To signal a road in the way indicated in Fig 1, when many trains are to make station-stops of considerable length, either for passenger business or for switching, contemplates an uneconomical use of the track, for it violates the fundamental principle that block sections should be of uniform length, measured by the time that trains occupy them.

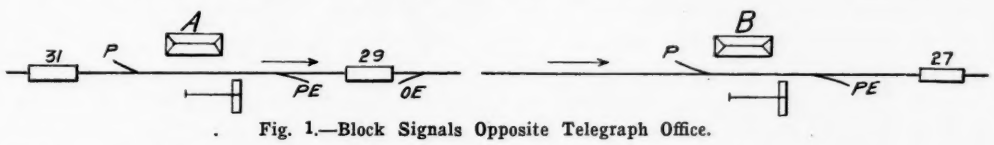


Fig. 1.—Block Signals Opposite Telegraph Office.

January Accidents.

The condensed record of the principal train accidents which occurred in the United States in the month of January, printed in another column, contains accounts of 31 collisions, 16 derailments and 3 other accidents. Those which were most serious, or which are of special interest by reason of their causes or attending circumstances, occurred as follows:

	Killed.	Injured.
†1st—Newville, Pa.	2	9
†3d—Edgemont, Md.	2	38
4th—Clancy, Mont.	0	1
†6th—Willard, Kan.	10	40
†25th—Seeburger, Mo.	4	6
*†26th—Diaz, Ark.	1	3
27th—Ann Arbor, Mich.	0	0
†31st—Miller, Kan.	1	13

* Fire. † Passenger killed.

The butting collision at Willard, due to carelessness in identifying a freight train on the side track, was the eighth of a series of accidents occurring since October 15 which killed ten or more persons each, the deaths in the other seven aggregating 165. All of these seven (Lambertville, N. J.; Indianapolis, Ind.; Kentwood, La.; Tremont, Ill.; Godfrey, Kan.; Laurel Run, Pa.; and East Paris, Mich.) were collisions, except Laurel Run. At a more quiet time the Willard case would have served as a striking object lesson in single-track train-running methods. It shows once more the futility of depending on a conductor to correct an engineman's error, and incidentally serves as a reminder that a third man in the cab would be likely to be of little value. It confirms the view that a man's interest in the safety of his own life may often have no effect whatever in keeping him vigilant and careful. It is high time that railroad officers —if no other class—abandon the notion that such interest does have a definite value as a promoter of safety. To keep a competent block-signal attendant at every meeting point every night would cost five or six hundred dollars yearly. That sum, multiplied by the number of night offices lacking, is a rough measure of the price of a fair degree of protection from butting collisions on many single-track lines. The block system is the only remedy for these collisions that is worth attention; and the lack of the necessary money appropriation or of the courage to introduce the block system appears as the main element in any analysis that is made to discover the reason why such disastrous collisions continue to occur.

The Clancy accident is mentioned in our table because of its peculiarity, not its magnitude. The Ann Arbor derailment illustrates the value of the principle embodied in the rigid rule of the Emperor William I. of Germany, who never allowed himself or his officers to appear in military circles with a single coat-button unbuttoned. An officer of the road says of this accident:

"This bridge is about 500 ft. long and the part of the structure upon which the accident occurred is a steel trestle with alternate 30 ft. and 42 ft. spans. In the train were 35 cars. They were being hauled by an 85-ton engine assisted by a lighter engine pushing. The sixth or seventh car was the first one derailed, and it derailed the following cars by going to the outside of the curve. Ten of these derailed cars got across the bridge all right, when the guard rail gave way and the ties were bunched until an opening was made large enough to let a truck through. The trucks in falling ripped out the bracing, and two girders on the outside of curve, one 30 ft. and one 42 ft., were knocked down, taking with them one trestle post. Six or eight inches of the bottom of the post was imbedded in concrete inside of the cylinder pier, and it broke off 15 or 18 inches above the foot. Ten cars went down." It appears to be the conclusion of the officers of the road that if the bridge floor had been perfect the derailed cars might all have crossed safely. The guard rail was lacking for 150 ft., and the guard stringer was not bolted, but only spiked. The ties were of oak and new, but the rails were spiked only to every other one. It seems that some repair work had been done and had been left as finished, when in fact it lacked completeness in the particulars mentioned.

The number of electric car accidents reported in January was 17, in which 7 persons were killed and 162 were injured.

NEW PUBLICATIONS.

The Earning Power of Railroads. By Floyd W. Mundy. Issued by James H. Oliphant & Co., 20 Broad street, New York.

Mr. Mundy has revised and brought to date his previous publication with the same title, for the Banking House of James H. Oliphant & Company. The present book devotes a chapter to each of the elements which go to make up the annual report of a railroad and discusses in detail the income account, operating expenses, maintenance expenses, etc. There is also a discussion of stock outstanding in its relation to earning power, and of guarantees and their relation to surplus available for dividends. This constitutes what may be called the editorial portion of the book and is followed by general exhibits, showing the income account of all the railroads whose statements are given (112 in number), considered as a single system. The annual reports of each of these roads are also summarized, with comparisons of mileage operated, gross earnings and surplus through a series of years. Earnings, operating expenses, net earnings, etc., are all reduced to a mileage basis for the last report at hand from each of the roads, covering as a rule the fiscal year ending June 30, 1903, and a compilation made in this way is exceedingly valuable for purposes of ready reference, particularly for those who have to review or analyze annual reports. The book is of small size, 7½ x 5 in., with 244 pages, but represents an enormous amount of statistical work. It is unique in the field it covers.

Recollections of an Ill-Fated Expedition. Compiled by Neville B. Craig, in compliance with a resolution of the Madeira and Mamore Association, for private distribution among the members of the Association. Published by J. B. Lippincott Company, Philadelphia, Pa. 1904.

This pamphlet of 70 pages, which was presented at the annual reunion of the Madeira and Mamore Association in Philadelphia, February 20, takes up the origin of what was known as the Collins expedition to the head of steam navigation on the Madeira River in Brazil, and is an exceedingly interesting document in its full and graphic description of the experiences of the men who tried to do the engineering work described recently in the *Railroad Gazette* by Mr. O. F. Nichols (Jan. 1, 1904, page 12). The present pamphlet is Part 1st of the series to be presented at subsequent annual meetings of the Association, and deals with the origin of the expedition which was to complete a railroad around the falls of the Madeira River and open up to commerce a rich and inaccessible part of the world. Viewed as an engineering and commercial project the enterprise was an entire failure, but it was replete with picturesque incidents.

TRADE CATALOGUES.

Safety Car Heating and Lighting Co., New York, has published in convenient pocket size, a small book containing directions for the management of and a catechism of steam-heating apparatus on trains. In the catechism the questions and answers have been outlined to cover the whole subject from a practical side. They are divided into four parts, description of the apparatus, operation of the apparatus, care of the apparatus and responsibility of employees. The book is intended for distribution among railroad employees and it is suggested that it be formally approved by the railroads and instructions given that it constitutes the rules of the railroad company. Copies will be furnished on request. The same company has also issued a directory of Pintsch gas plants in the United States and an accompanying map of the United States showing railroads using Pintsch gas and the location of generating plants in the different cities. They show for the first time the plants at Philadelphia, Pittsburg, Altoona and Harrisburg, which are among the seven works now building to supply the Pennsylvania, on which Pintsch gas light has recently been adopted as standard.

The Wabash Railroad is sending out a special World's Fair folder giving interesting information about the approaching Louisiana Purchase Exposition. There are a large number of half-tone engravings of general and detail views of buildings and decorations, and two maps, one of the fair grounds with an index to the location of the buildings, and one of the central section of the city of St. Louis showing the fair grounds, Union Station and the Wabash road between the two. There are also views of the Wabash passenger station at Pittsburg, to be opened in May, and of the station which this road will have at the fair grounds. The cover of the folder has an appropriate design, in colors.

The Trussed Concrete-Steel Company, Detroit, Mich., has issued a pamphlet catalogue which gives a general description of the Kahn system of re-inforcement as applied to the construction of floors, girders, columns, etc. Formulæ for their calculation and tables showing safe loads for various spans built in accordance with this system are presented. A set of specifications for re-inforced concrete is given, together with drawings of different forms of concrete-steel structures, including girders, culverts, arches, dams, etc. Articles relative to the Kahn system were printed in the *Railroad Gazette* Oct. 16, 1903, and Jan. 22, 1904.

The Chicago & North Western has published a 50-page pamphlet describing the Black Hills country in South Dakota. The pamphlet is illustrated with a general map and 35 excellent photogravures of scenery in this district, and contains a description of its mining operations and other natural resources, as well as its features of scenic interest. Copies can be obtained from the Passenger Department on application.

Westinghouse Electric & Mfg. Co., Pittsburg, Pa., describes auxiliary apparatus for railroad equipments in a small catalogue, No. 4006, just issued. The parts illustrated and briefly described include choke coils, switches, fuse blocks, lightning arresters, circuit breakers, etc. A standard circular, No. 1061, issued by the same company, illustrates automobile charging outfits for stations and private plants.

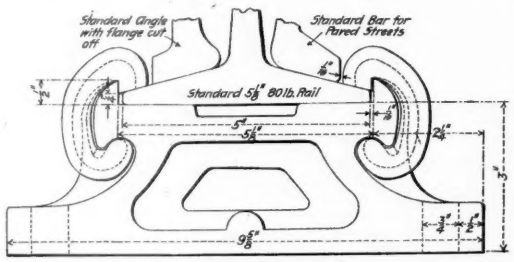
The A. H. Andrews Co., Chicago, Ill., has prepared a neat little circular with the emphatic title "We Know How." What it claims to know how to do is the designing and making of office furniture, which is its specialty. The only illustration is a view of what the owners state to be the finest and best equipped factory in America for turning out high grade furniture.

Fairbanks, Morse & Co., Chicago, Ill., describe hoists and hoisting machinery operated by gasolene, naphtha, distillate, kerosene or crude oil in a new edition of its illustrated catalogue, No. 45B. The class of machinery described is especially useful and economical for mining and prospecting outfits where fuel and water are scarce and at other places where the service required is intermittent.

Phosphor-Bronze Smelting Co., Philadelphia, Pa., has just published a revised price list for 1904 which supersedes all previous quotations for phosphor-bronze plates, sheets, wire, rods and castings.

Rail Chairs for Stone Block Paved Streets.

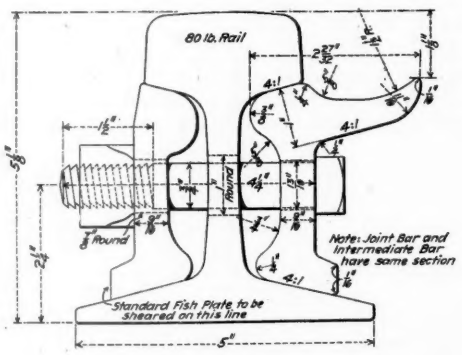
The system of rail chairs and shell tram-bar rail attachments used by the New York Central in city streets paved with stone blocks, in order to avoid the use of a girder type of tram rail of a weight and strength adequate to properly sustain the loads of modern heavy rolling stock, was described in the *Railroad Gazette*, Jan. 26, 1894. At that time, track of this construction had just been laid



Detail of Duggan Track Chair for Paved Streets.

in Washington street, Syracuse. The peculiar features of the construction, which gives all the advantages of the girder rail at much less cost, embody a shell tram-bar attachment to the standard rail, converting it in effect into a street tram rail, which is supported on cast iron raising chairs of special design. The rails are fastened to the chairs by malleable iron clips or holders.

The device was designed as a standard railroad track in paved streets by Mr. Walter Katte, then Chief Engineer of the New York Central, and was first used by him for the tracks in New York City on West, Canal and Hudson streets, between Gansevoort street and St. John's Park, and also at the crossing at the intersection of Eleventh avenue and Forty-second street, when the city authorities laid the present granite paving block pavement on these streets, some years ago. It is now to be applied on Tenth avenue, from Thirtieth street to St.



Tram-Bar Track Attachment.

John's Park, about three miles, with certain modifications made by Mr. A. T. Hardin, Engineer of Maintenance of Way of the New York Central. The chairs which were used in Syracuse were 5 in. high. The type now adopted are 3 in. high, as shown in the accompanying drawing. The section of the fish plate used at joints is also shown. Eighty-lb. rails are to be used, as at Syracuse, instead of the 65-lb. section formerly laid in the New York streets. The raising chairs and malleable iron clips are supplied by the Burnham and Duggan Railway Appliance Co., of Boston, the chair being the Duggan patent.

Train Accidents in the United States in January.[1]

†1st, Cumberland Valley, Newville, Pa., a southbound passenger train was derailed at a misplaced switch and one passenger car was overturned. Two passengers were killed and 9 were injured, including the general superintendent of the road.

xc, 3d, 9 a. m., New York Central & Hudson River, Utica, N. Y., westbound mail train No. 35 collided with a train of empty passenger cars in the yard, wrecking several of them and damaging the leading one of the two locomotives of the mail train. The runner of this engine was killed. The collision appears to have been due to excessive speed approaching the station. A severe snowstorm and extremely low temperature prevailed at the time.

†dr, 3d, Western Maryland, Edgemont, Md., the rear car of a passenger train was derailed by a broken rail and fell down a bank, being overturned twice. The car was wrecked and all of the 40 passengers in it were injured, two or more of them fatally.

rc, 4th, Chicago, Milwaukee & St. Paul, Le Claire, Iowa, a freight train ran into the rear of a preceding freight, wrecking the caboose. A brakeman was killed and a drover in the caboose was injured.

xc, 4th, Great Northern, Clancy, Mont., a locomotive without a train became uncontrollable on a descending grade and collided with a freight train, wrecking both engines and several cars. The engineman and fireman jumped off before the collision; the engineman was slightly injured and the fireman, landing in a snow-bank, was not seriously hurt. The engine was out of order and was being taken to the shop.

eq, 4th, Chicago, Milwaukee & St. Paul, Lindon, Wis., a fast mail train was derailed by the breaking of a driving wheel of the locomotive and 7 mail cars were ditched. Several mail clerks were injured.

o, 4th, 1 a. m., Philadelphia & Reading, Woodburn, Pa., the locomotive of a freight train was wrecked by the explosion of its boiler, and the fireman and one brakeman were killed. The engineman was injured.

rc, 5th, Alabama Great Southern, Livingston, Ala., a freight train ran into the rear of a preceding freight; three trainmen injured.

bc, 6th, 1.35 a. m., Chicago, Rock Island & Pacific, Willard, Kan., butting collision between westbound passenger train No. 3 and an eastbound stock train, wrecking both engines, the first four cars of the passenger train and the first six cars of the stock train. A number of passengers and trainmen were killed and about 40 injured. The reports of casualties are contradictory, but the total number of persons killed appears to be at least seven. The collision was due to the failure of the passenger train to wait at Willard for the stock train, as it had been ordered to do. Another freight train was standing on the side track at that station and the conductor and engineman of the passenger train assumed that it was the stock train.

unx, 6th, Chicago, Burlington & Quincy, Rockford, S. Dak., a passenger train was derailed on or near a bridge, and one passenger car fell through the bridge into a creek. A sleeping car rolled down a bank. Nine passengers were injured.

bc, 7th, Gulf & Ship Island, Ralston, Miss., butting collision between a wrecking train and a work train, wrecking both engines and several cars. Three employees were injured, one of them fatally.

xc, 7th, Ocala, Fla., a yard engine of the Seaboard Air Line ran into a passenger train of the Atlantic Coast Line, at the crossing of the two roads and overturned the last passenger car. Four passengers were injured.

xc, 8th, 3 a. m., Baltimore & Ohio, Evitts Creek, Md., eastbound passenger train No. 4 collided with a freight train which was switching on the main track, badly damaging both of its two engines and several freight cars. Both of the firemen and one of the enginemen of the passenger train were killed and four other trainmen were injured.

xc, 8th, Atlantic Coast Line, Orange Park, Fla., collision of freight trains: one engineman killed.

xc, 8th, Missouri Pacific, Coffeyville, Kan., collision between a passenger train and a freight; four passengers and one trainman injured.

bc, 9th, Denver & Rio Grande, Arena, Col., butting collision between passenger train No. 1 and an empty engine, wrecking both engines and the baggage car. One trainman was killed and three were injured.

xc, 10th, Vandalia Line, East St. Louis, Ill., a train consisting of an engine and a caboose ran over a misplaced switch and collided with some freight cars. One employee was killed and three others were injured.

bc, 11th, Pennsylvania road, Strawbridge, Pa., collision between a freight train and a work train; 20 employees injured.

bc, 11th, Southern Railway, Gaffney, S. C., butting collision of freight trains: one engineman killed and two injured.

bc, 11th, Southern Railway, Blacksburg, N. C., butting collision of freight trains; one unknown man killed and four employees injured. It is said that the conductor and engineman of the northbound train misread a telegraphic order.

dr, 11th, Erie road, Hancock, N. Y., eastbound passenger train No. 4 was derailed by a broken rail and the whole of the train, except the engine and one car, fell down a bank into the Delaware River. Two passengers and four employees were injured.

bc, 13th, Georgia Railway, Dearing, Ga., butting collision of freight trains, badly damaging both engines and 15 cars. Two trainmen were injured.

xc, 13th, Southern Railway, New Baden, Ill., collision of freight trains, due to a misplaced switch; one engineman killed and two employees injured, one of them fatally.

xc, 13th, 2 a. m., Southern Railway, Charleston, N. C., collision between a freight train and a switching engine; one fireman killed.

rc, 14th, Rutland road, Rouses Point, N. Y., a freight train, unexpectedly stopped on a steep descending grade, was run into at the rear by a following freight train, wrecking the engine and several cars. Two trainmen were

[1]Accidents in which injuries are few or slight and the money loss is apparently small, will as a rule be omitted from this list. The official accident record published by the Interstate Commerce Commission quarterly is regularly reprinted in the *Railroad Gazette*. The classification of the accidents in the present list is indicated by the use of the following

ABBREVIATIONS.

rc	Rear collisions.
bc	Butting collisions.
xc	Miscellaneous collisions.
dr	Derailments; defect of roadway.
eq	Derailments; defect of equipment.
dn	Derailments; negligence in operating.
unf	Derailments; unforeseen obstruction.
unx	Derailments; unexplained.
o	Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

killed and several others injured. Slippery rails, due to a freezing rain storm, are said to have been the immediate cause of the inability of the men in charge of the second train to control its speed.

o, 14th, Philadelphia & Reading, Narcissa, Pa., the locomotive of a freight train was wrecked by the explosion of its boiler, and three employees were badly scalded.

o, 15th, New York Central & Hudson River, Syracuse, N. Y., the locomotive of a freight train was wrecked by the explosion of its boiler. Two trainmen were killed and another was fatally injured.

*rc, 18th, St. Louis, Iron Mountain & Southern, Newport, Ark., a freight train which had been unexpectedly stopped and which was detained some time waiting for the engine to go several miles for water, was run into at the rear by a following freight, and the caboose and several cars were wrecked. The wreck took fire and was partly burnt up. A brakeman was burnt to death and a tramp riding in one of the cars was killed. The brakeman who was burned to death was the one who should have protected the standing train by flagging, and it is said that he was asleep in the caboose.

xc, 18th, Iowa Central, Peoria, Ill., a number of cars being switched eluded control and ran at high speed to the foot of a grade, where they collided with a freight train. Three employees were killed and two injured.

xc, 19th, Lake Shore & Michigan Southern, Oak Harbor, Ohio, collision between a westbound and an eastbound freight, one of which was moving from a siding to the main track; and both engines and 10 cars were wrecked. One engineman was killed.

dn, 19th, 1 a. m., Missouri, Kansas & Texas, Boonville, Mo., passenger train No. 6 was derailed at a misplaced switch, and the engine was overturned. Six cars were ditched. One passenger and two trainmen were injured.

unx, 19th, Seaboard Air Line, Irondale, Ala., a work train moving backward was derailed, and one car fell down a bank. The conductor was killed and 16 employees were injured.

rc, 20th, Pittsburg, Fort Wayne & Chicago, Davis, Ind., westbound fast mail train No. 25 ran into the rear of a preceding freight, and three trainmen were injured. There was a dense fog at the time.

rc, 21st, Wabash road, South Englewood, Ill., a northbound passenger train was run into at the rear by a following freight, and two passengers were injured.

*xc, 21st, Pennsylvania road, Altoona, Pa., collision between an eastbound and a westbound freight, wrecking two engines and 11 cars. The wreck took fire and was mostly burnt up.

*†rc, 25th, St. Louis, Keokuk & North Western, Seeburger, Mo., an express train standing at a water tank was run into at the rear by a following local passenger train and two passengers and two trainmen were killed and 5 passengers and one trainman injured. The collision occurred on a bridge, and one span of the bridge with two cars of the local passenger train, were burnt up. There was a blinding snowstorm at the time.

*dr, 25th, Great Northern, Benson, Minn., a passenger train was derailed by a broken rail and a sleeping car was overturned and fell down a bank. The car took fire from the lamps, but the flames were extinguished by the passengers. Six passengers were slightly injured.

unf, 25th, Illinois Central, Gates, Tenn., passenger train No. 2, second section, was derailed by the misplacement of a switch by the carcass of a cow which was struck by the engine of the train just as it was passing the switch at high speed. A man standing near the track was killed.

*†rc, 26th, 11 p. m., St. Louis, Iron Mountain & Southern, Diaz, Ark., a passenger train which had stopped to take coal was run into at the rear by a following passenger train, and two cars of the standing train were wrecked. The newsboy of the standing train saw the approaching express train and warned the passengers, so that nearly all of them escaped from the cars before the collision; nevertheless, one passenger was killed and three were injured. The wreck took fire, and four cars, two in each train, were burnt up.

*dn, 26th, 2 a. m., Duluth & Iron Range, Two Harbors, Minn., a freight train became uncontrollable on a steep descending grade and, after running five miles at high speed, was derailed at a curve, wrecking all of the cars and a station building. The wrecked building took fire and was burnt up. The engineman and fireman jumped off and escaped uninjured and the conductor and brakeman escaped by cutting off the caboose and stopping it.

26th, St. Louis & San Francisco, Oklahoma City, Okla. T., a passenger train was derailed, and the whole train, except the front truck of the engine, ran 300 ft. across a trestle bridge on the sleepers. It is said that a rail of the track had been broken by a train which had passed over it a short time before.

unx, 26th, Tennessee & North Carolina, Waterville, Tenn., a mixed train consisting of an engine, one passenger car and one freight car, the engine behind and the freight car in front, was derailed, and both cars fell down a bank into a stream of water. Two passengers and one trainman were injured.

bc, 27th, Louisville & Nashville, Middlesboro, Ky., butting collision of freight trains, one of them a train of the Southern Railway, badly damaging the engines and several cars. Four trainmen were injured, one of them fatally.

27th, New York, New Haven & Hartford, Housatonic, Mass., a passenger train was derailed and one parlor car and one day car fell down a bank, lodging on the ice of the Housatonic River. Six passengers were injured.

27th, Ann Arbor road, Ann Arbor, Mich., a freight train was derailed on or near the bridge crossing Huron River and 12 cars broke through and, with one span of the bridge, fell about 60 ft. to the stream below.

unx, 27th, 7 p. m., Chicago, Burlington & Quincy, Ashland, Neb., the mail car in passenger train No. 12 was derailed as it passed over a switch in the yard. Broken pieces of the car or of the track flew up and struck and killed the engineman of a freight train who was oiling his engine on a side track.

bc, 28th, 9 p. m., Baltimore & Ohio Southwestern, Cullom's, Ohio, butting collision between eastbound passenger train No. 8 and westbound freight train No. 57, wrecking both engines and several cars. The engineman of the passenger train was killed and the fireman of that train and four passengers were injured, the fireman fatally. It is said that the freight was running on the time of the passenger, in consequence of the engineman's watch having stopped.

xc, 29th, Pennsylvania road, Altoona, Pa., an engine in the yard collided with some freight cars, and the engineman was killed.

xc, 29th, Atlantic Coast Line, Stony Creek, Va., collision of freight trains; one tramp killed, one engineman injured.

bc, 30th, New York Central & Hudson River, Big Moose, N. Y., butting collision of freight trains; three trainmen injured, two of them fatally. It is said that the collision was due to a mistake in telegraphic orders.

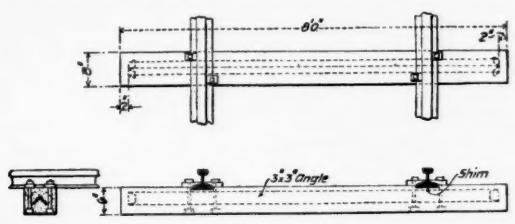
†dr, 31st, Missouri Pacific, Miller, Kan., a passenger train was derailed by a broken rail and all of the cars except one were ditched. One passenger was killed and 13 were injured.

unf, 31st, Southern Railway, Princeton, Ind., a passenger train was derailed and two cars fell down a bank. Several passengers were slightly injured. It is said that a rail had been maliciously loosened.

A New Concrete Tie.

The simple form of concrete tie shown by the illustration has been patented by David S. Affleck, Chestertown, Ind. The tie is 6 in. x 8 in. x 8 ft. long and is made of 1-2-2 concrete around a 2½-in. x 2½-in. x 5/16-in. angle, 7 ft. 10 in. long. At each end the angle is split a short distance and the legs bent outward in short curves to give a better anchorage. The rails are held by clips and bolts, the latter passing through the tie with their heads fitting in recesses on the under side.

Beneath, and parallel to, each rail there is shallow depression in the upper surface of the tie, in which is



Affleck Concrete Tie.

fitted a wooden shim, flush with the top. The weight of a tie is 400 lbs. Two have been in the Lake Shore & Michigan Southern track at Dune Park, Ind., since the first of June, with satisfactory results, it is claimed.

Mr. Affleck is prepared to furnish the ties both to steam and electric roads, at $1.75 to the former and $1.50 to the latter; or he will sell track rights for their use at $50 per mile, on the condition that the right be bought for the entire line.

First Meeting of the Canadian Railroad Commission.

The first meeting of the newly elected Canadian Railroad Commissioners was held at Ottawa, Feb. 9. The following extract is taken from the address of the Hon. A. G. Blair, Chief Commissioner:

The powers and the jurisdiction conferred upon this board are comprehensive in their scope, far-reaching in their effects and they will touch at a vital point the already immense and constantly increasing business interests of the country on the one hand and the great and always growing railroad interests on the other.

It was not in the contemplation either of the framers of the bill or of Parliament, in enacting it, that it should be so administered as to jeopardize or impair the just and proper interests of either the railroads or the public. In our judgment, these interests rightly understood and properly regulated, are not hostile or adverse, but in the largest sense complementary to one another, helpful and concurrent. In so far as we are endowed with capacity for the purpose, it shall be our endeavor in this sense so to administer the law.

No member of this board has heretofore had experience in dealing with all the classes of problems which will come before us for solution. Some of us have had but little, if any, experience as to some of these questions which will arise, but this condition was, under existing circumstances, necessarily unavoidable. We can, therefore, only bespeak for ourselves the lenient forbearance of a considerate and generous public.

This board succeeds to a very large accumulation of arrears of business of very great importance. No doubt that an early disposal of this business will be urgently pressed upon us from all sides, but a little reflection will convince those interested that it will be impossible for the board, until at least after the lapse of some few weeks, to deal with these subjects. Since the law came into operation on the 1st instant it was quite impossible that we could take steps to organize the staff; we have no quarters yet ready for our occupation, so that we are without a staff, and without quarters in which to transact our business. The accommodation is being provided for us with all possible celerity, however. All who have had experience in business of this kind will readily acknowledge that it will be quite impossible to deal at once with the business that has now accumulated. Since we have been a board, there have been quite a number of new matters submitted to us, and we can only say that with regard to all of these it shall be our endeavor to consider them at the very earliest moment.

There will be, of course, certain rules and regulations which the board, after consideration, will determine upon and make public. These will be framed with a view of facilitating business and methodizing the procedure before the board. It is not the purpose of the board to prescribe any rules or regulations such as are in force in the higher courts of the land; that will not be our design. The rules framed by us will be simply with a view of facilitating business, and of furnishing such necessary guides as may be required by those who have to transact business before the board.

The growth of the petroleum shipments from Galicia (Austrian Poland) are indicated by the number of carloads forwarded from Boryslav, the chief shipping station for the wells. These have been in successive years: 1892, 196; 1895, 6,726; 1896, 12,376; 1900, 20,758; 1902, 33,541; 1903, 39,662. This is a rapid growth, indeed, but the total is not what would be considered large in this country or Russia. Seventeen pipe lines lead oil to tanks in Boryslav, which will hold 17,000 carloads; and 155 tank cars can be filled in 20 minutes at the station.

International Engineering Congress at St. Louis.

An International Engineering Congress, under the auspices of the American Society of Civil Engineers, will be held at the St. Louis Exposition, during the week of Oct. 3 to 8, 1904. The Congress will be one of a series of International Scientific Congresses to be held at the Exposition under the general authority and with the cooperation of the Director of Congresses.

The object of the Congress is to secure a thorough International consideration of certain branches of engineering work which have been selected with special reference to their present interest and importance. The subjoined list of subjects proposed is tentative, and may be slightly modified as the details of the programme are perfected. As a basis for discussion at the sessions of the Congress, the committee has invited engineers specially qualified in each of the various branches covered in the list of subjects to prepare a review of the development during the past ten years in that branch of engineering in the United States, together with a summary of present practice. Engineers in other countries, experienced in these various lines, will be specially invited to prepare similar papers presenting a review and summary of practice in their respective countries. It is proposed to print these papers in advance, in order that a full discussion at the various sessions may be elicited without giving up any time to the reading of papers at the Congress.

All engineers in the United States and in all other countries are invited to become members of the Congress, to attend the sessions, and to take part in the discussions; or, if unable to attend, to forward written communications on any of the selected subjects. It is not expected that delegates will be formally appointed, it being intended that an opportunity to attend shall be afforded to any who may wish to become members of the Congress.

The papers, together with the discussions upon them, will be collated and published in one or more volumes by the American Society of Civil Engineers. The membership fee in the Congress will be $5, which will entitle the member to participate in the Congress and to receive a copy of the published proceedings.

Membership may be secured by forwarding this fee, with name and address, to the Secretary of the Committee, Charles Warren Hunt, 220 West 57th street, New York city, who will issue a receipt therefor. Each member will receive all notices, programmes, etc., issued in advance of the Congress.

The following is the list of subjects:

1. Harbors.
2. Natural Waterways.
3. Artificial Waterways.
4. Lighthouses and Other Aids to Navigation.
5. Traffic on Improved Waterways, as Compared with Seaboard Traffic, and the Effect of this Development on Railroad Traffic.
6. Purification of Water:
   a For Domestic Use.
   b For the Production of Steam.
7. Turbines and Water Wheels.
8. Irrigation.
9. Railroad Terminals:
   a At Ports.
   b Inland.
10. Underground Railroads.
11. Locomotives and Other Rolling Stock.
12. Live Loads for Railroad Bridges.
13. The Substitution of Electricity for Steam as a Motive Power.
14. Sewage Disposal.
15. Disposal of Municipal Refuse.
16. Ventilation of Tunnels.
17. Highway Construction.
18. Concrete and Concrete-Steel Construction.
19. Deep Foundations.
20. The Manufacture of Steel.
21. Tests of Materials of Construction.
22. Passenger Elevators.
23. Pumping Machinery.
24. Dredges: Their Construction and Performance.
25. Steam Turbines.
26. Electrical Power:
   a Generating Stations.
   b Transmission.
27. Naval Architecture.
28. Marine Engineering.
29. Dry Docks.
30. Ordnance.
31. Fortifications.
32. Mining Engineering. (Sub-divisions under this heading not yet determined.)
33. Engineering Education. (Sub-divisions under this heading not yet determined.)

TECHNICAL.

Manufacturing and Business.

The Massillon Iron & Steel Company, of Massillon, Ohio, maker of cast-iron pipe and fittings, has increased its capital stock from $150,000 to $500,000.

W. E. Bryant, heretofore in the Sales Department of the Michigan Lubricator Company, Detroit, Mich., has been elected Vice-President of the company.

The Monarch Coupler Company, Ltd., announces that it has secured the Thornburgh patents for draft riggings and will continue their manufacture and sale.

The resignation of Rufus C. Crawford, Auditor of the National Tube Works Company, McKeesport, Pa., has been accepted and he will be succeeded by S. H. Fox.

Pogson, Peloubet & Co., public accountants, announce the removal of their New York office to 42 Broadway. The telephone number has been changed to 6338 Broad.

The Star Brass Manufacturing Co., of Boston, has changed its Chicago office from the Monadnock building to 303 Fisher building. Mr. Wm. T. Johnson is in charge of the office.

The Thompson Air Compressor Company, New York, has been incorporated, with a capital of $50,000. C. O.

Thompson, H. M. Seely and W. M. Stockbridge, New York, are directors.

The Phail-Krueger Foundry & Machine Company, of Brooklyn, N. Y., has been incorporated in New York, with a capital of $30,000. The directors are George A. Phail, of Flushing; F. E. Krueger, of Douglaston, and others.

The Baltimore & Ohio roundhouse at Garrett, Ind., and also the new roundhouse of the Baltimore & Ohio Southwestern at Cincinnati, have been equipped with "Giant" cast-iron smoke-jacks made by Paul Dickinson, Chicago.

Bids are wanted, March 15, by the Great Falls & Old Dominion R. R. Co., Washington, D. C., for furnishing 1,600 tons 70-lb. tee rail; also 5,200 standard six-hole channel bar joints complete. W. B. Upton is Chief Engineer.

The Gilmore-McArdle Company, of Minneapolis, has been incorporated with a capital of $100,000, to make engines, boilers and machinery. J. K. Gilmore is President; J. D. McArdle, Treasurer, and Frank S. Hinkley, of St. Paul, secretary.

The Crown Drilling & Machinery Company, organized with a capital stock of $100,000 by H. W. Cole, of Cleveland, has bought the works of the Akron Engineering Company, at Akron, Ohio, and will make drilling machinery. H. W. Cole is President of the company.

The Chihuahua & Pacific Railroad Company, 80 Broadway, New York, is in the market for steel rails and fastenings, switches, switch stands and frogs, structural steel for bridges and iron pipe for culverts; also telegraph and other material for use in Mexico.

A new Westinghouse-Parsons 400 K. W. steam turbine has just been installed in the Sherwin-Williams Co.'s plant at Cleveland, Ohio, and is now furnishing power to all departments. This new turbine is the first of its type to be put into use in Cleveland, and is the first ever placed in the power house of any paint plant.

The Climax Stock Guard Company, of Canton, Ohio, announces that F. W. Stewart has been appointed General Manager of the company, with headquarters at 503 Title and Trust Building, Chicago, and that he has full charge of the Sales Department. H. E. Overstreet, formerly General Sales Agent, with headquarters at Chicago, is no longer connected with the company.

Mr. P. H. Wilhelm, hitherto representing various railroad supply firms in Atlanta, Ga., is now the representative of the American Steam Gauge & Valve Manufacturing Company, of Boston, Mass. Mr. Wilhelm was formerly for many years in railroad service, and in 1893 was Division Superintendent of Transportation at the World's Fair in Chicago. His headquarters will be at the home office of the company (Boston).

The statement of the Union Switch & Signal Company for the year ended Dec. 31, 1903, shows: Gross receipts, 1903, $2,132,835, 1902, $1,774,005, 1901, $1,605,649; interest and other disbursements, 1903, $1,803,513, 1902, $1,420,322, 1901, $1,308,143; net, 1903, $329,322, 1902, $353,683, 1901, $297,506; preferred dividends, 1903, $130,867, 1902, $79,726, 1901, $79,726; surplus, 1903, $198,455, 1902, $273,957, 1901, $217,780.

An example worthy of general emulation is found in the action recently taken by the Vulcan Iron Works Company, Toledo, Ohio, as expressed in the following notice posted on the bulletin boards of the works: "This company will pay full time to any employee who is a member of the Ohio National Guard when out on parade with his company, at rifle practice, at camp duty, or when serving under the Governor or Sheriff to put down a riot."

The Headson Tool and Manufacturing Company has been incorporated in New York, with a capital of $100,000. The company is fitting up a modern shop in Lafayette, Ind., and will make a new type of pipe cutter that does not leave "burrs" on the pipe, automatic pipe and monkey wrenches and other specialties. The officers of the company are: President, L. J. Lippmann, New York; Vice-President, F. A. Headson, Lafayette, Ind.; Secretary, H. Pottlitzer, Lafayette, Ind.

At the annual meeting of the stockholders of the Pressed Steel Car Co. in Jersey City, Feb. 16, the retiring members of the board, James A. Blair, Frederick G. Ely and A. S. Matheson, were re-elected. The board of directors re-elected the officers and executive committee, as follows: F. N. Hoffstot, president; J. W. Friend, vice-president; A. H. Larkin, secretary; P. G. Jenks, treasurer; S. E. Moore, auditor, and G. E. Macklin, general manager. Executive Committee—F. N. Hoffstot, James A. Blair and Adrian S. Larkin.

Iron and Steel.

The Buffalo & Susquehanna Iron Company, of Buffalo, has increased its capital stock from $600,000 to $1,000,000.

The Republican Iron & Steel Company and others have recently advanced the price of bar iron $1 per ton, due to the better conditions of the iron and steel trade in general.

The National Rolling Mill Company has started fires in the furnaces at its new plant at Vincennes, Ind., and it is expected that all departments will be in operation shortly.

Pittsburg reports say that the Southern interests of the Republic Company are to be merged with those of the Tennessee Coal, Iron and Railroad Company and the Sloss-Sheffield Steel and Iron Company.

Ashton Pocket Test Gage.

The Ashton Valve Co., Boston, Mass., has recently put on the market a convenient form of standard pocket test gage which is useful for air-brake inspectors, boiler inspectors, master mechanics, chief engineers of power plants and others. It is light and accurate and is of a suitable size and construction to be carried in the pocket or hand-bag without being injured. The front is beveled plate glass, protected by a metal cover and the spring is of solid-drawn seamless steel tubing with non-corrosive movement. The gage weighs about 1 lb., is 3 in. in diameter and is graduated for any pressure up to 500 lbs.

Allis-Chalmers Company in Europe.

Announcement is made by Wm. J. Chalmers, Vice-President of the Allis-Chalmers Company, that the company has formed a coalition with several important English and European manufacturing concerns, under the name of the Turbine Advisory Council, practically doubling the industrial activity of his company in the making of steam turbines, hydraulic machinery, gas engines and electrical machinery. The companies forming the Steam Turbine Advisory Syndicate of England are the Yarrow Shipbuilding Co., the Tweedle Shipbuilding Co. and Williams & Robinson. It is said that there will be no increase at present in the plants of the corporation.

The Safety Car Heating & Lighting Co.

The Safety Car Heating & Lighting Co. did the largest business in its history during the calendar year 1903. The company equipped 2,209 cars with Pintsch light equipment and 2,964 cars with heating equipments. The annual statement for 1903 of the Julius Pintsch Co., of Berlin, giving statistics of the application of Pintsch gas for lighting railroad cars, buoys and beacons throughout the world, shows that up to December 31 this system of lighting was in use on 128,881 cars, 5,806 locomotives and 1,426 buoys and beacons. There are now installed 372 plants for making the gas, of which 80 are in the United States. Of the total number of cars equipped, 22,243 cars are in service in this country, and of the buoys and beacons 198.

New Lackawanna Ferry Steamers.

The Delaware, Lackawanna & Western is to have for its New York city passenger service four new double-deck, twin screw ferry boats, and the contract for building them has been awarded to the Newport News Ship Building Co. The new boats will be 231 ft. long, 62 ft. beam and have a draft of 10 ft. 6 in. Steam will be supplied by two Scotch boilers for two sets of compound engines, the horse power being 1,400 and the speed 14 miles an hour. The plans call for boats considerably larger than the largest ferry boat now running on the North River. The hulls will be sub-divided by water-tight bulk-heads to minimize the danger from collisions. The finish of the interior will be in Colonial style and the lighting will receive special attention, so that, by day or by night, a passenger will be able to read the newspapers in any part of the cabin. The plans have been furnished by Gardner & Cox, of New York, working in consultation with Colonel E. A. Stevens, of Hoboken.

Mr. Ismay President of Ship "Combine."

At a special meeting of the directors of the International Mercantile Marine Company, Feb. 23, Clement A. Griscom resigned as President, and J. Bruce Ismay was elected to succeed him. Mr. Griscom will retain his interest in the management as chairman of the board. Mr. Ismay is managing director of the White Star line, with headquarters in Liverpool, but will make his home in New York when he enters upon his new duties. It is understood that it has always been Mr. Griscom's ambition to bring about a combination under one management of steamship lines in the North Atlantic. Now that this has been accomplished, he feels free to relieve himself of the strain of active management. Mr. Ismay, who was actively associated with Mr. Morgan and Mr. Griscom in forming the combination, succeeded his father as the head of Ismay, Imrie & Co., the operating owners of the White Star fleet in the North Atlantic, and also those running from England to Australia and from San Francisco to the Orient.

Advisory Commission for the Barge Canal.

Governor Odell has appointed the Advisory Commission to have charge of the $101,000,000 improvement of the Erie canal. State Engineer and Surveyor Bond will be Chairman, with a salary of $8,000, and the other commissioners will be Alfred Brooks Fry, now in charge of United States buildings at the Port of New York; Dr. Elmer L. Corthell, William A. Brackenridge and Major Thomas W. Symonds. These commissioners will receive an annual salary of $7,500. It is safe to say that this is as meritorious a commission as has ever been appointed by the State for public work. Dr. Corthell has had a lifelong experience in dealing with navigable waterways, the work in connection with which he is most widely known being the construction of the jetties in the Mississippi delta. Mr. Brackenridge is engineer in charge of the Niagara Falls Power Company. Major Symonds, United States Engineer in charge of the public buildings at Washington, designed and built the monumental breakwater improvement work at Buffalo, which has been described in the *Railroad Gazette*. The special fitness of each man for his place on the commission shows the thoroughly non-political character of the appointment.

Burlington Dining Cars.

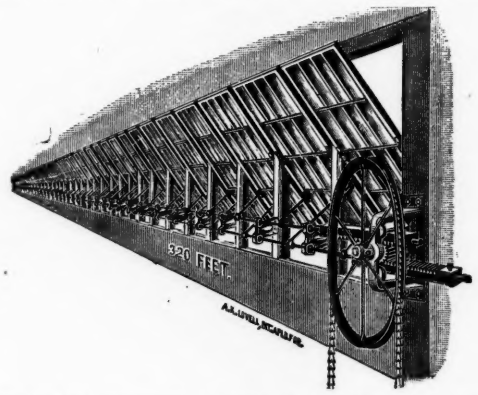
Sweet and unusual words of appreciation have come to the officers of the Chicago, Burlington & Quincy from the strictly lady-like pages of the *Ladies' Home Journal* in the following impression produced by the company's dining cars:

"The whole effect, as one enters the car, is that of an artistically-treated Flemish oak dining-room. Instead of the offensively gilded and frescoed ceilings of the typical Pullman diner, the ceiling has been treated with longitudinal beams and cross-beams, giving, with excellent result, the effect of a beam-ceilinged room. Between the beams the ceiling shows a quiet tone of deep yellow, of plain monochrome. On the sides of the car have been used, to good advantage, a dark brown Flemish stained oak wainscoting, with not an inch of the wood carved, but of plain surface rubbed down to a dull finish so that all the beauty of the superb grain of the wood is brought out. For the color scheme yellow has been used throughout the car, the designer having apparently in mind the rich color of the sunflower. One can easily imagine with what effectiveness the yellow of the decoration and the deep brown of the wood bring out the white linen, glass and china on the tables. The chairs, the brass trimmings on the doors—every detail, in fact, has been kept in accord with the general Flemish design. There is not a jarring note in the design and decoration, and one dines in the dining-cars of this railroad [which are made from the company's designs] feeling all the delight that accompanies a private dinner in an artistic home."

Mr. Burnham, the distinguished architect, in an address to the Commercial Club in Chicago, says that, while too few business men are willing to acknowledge it, beauty and harmony are at the root of all real happiness. In this the Burlington road has done much, both in the design of these dining cars three years ago, and, later, in its chair cars and day coaches, which also are characterized by simplicity of line and color schemes.

The Lovell Window Operating Device.

The accompanying engraving shows the application of the Lovell window and shutter operating device to a continuous line of pivoted sash, 320 ft. long, by means of which all of the sash may be opened or closed to any degree from one station. This apparatus, which was first introduced a little more than a year ago, is adapted to operating any kind of hinged, pivoted or sliding sash. It consists essentially of a loop of chain running over a wheel mounted on the same shaft with a pinion which engages two horizontal racks. The operating rods, carried in suitable brackets on the ports between windows, are attached to these racks and have a simultaneous



longitudinal movement in opposite directions. At each window, two link-arms are attached at one end to pivotal swivel collars on the operating rods and at the other end to clips on the sash stiles. When the window is closed the link-arms lie across the face of the window in approximately a horizontal position and parallel to it. As the operating rods move past each other the link-arms are forced out to a position at right angles to the rods and push out the sash with them. For hinged sash, there need be only one link-arm and operating rod, for pivoted sash the apparatus is as described and for sliding sash the link-arms are merely turned to lie in a vertical position when the window is closed. The operating station for an entire building is usually placed on the wall at the end or side of the building so that in case of fire the windows can be quickly closed while the people are leaving the building. The arms operate the sash with a straight push and pull of the rods instead of a twist, and this is an advantage. G. Drouvé Co., Bridgeport, Conn., makes the device.

Pressed Steel Car Company.

The report for the year ending December 31, 1903, shows gross sales for the year of $26,273,910, a decrease of over 7 millions from the sales of the year previous, but an increase of $3,250,000 over the sales of 1901. For the first six months of the fiscal year the sales exceeded the same period of the previous year by 23 per cent., the ultimate decrease being due to the general depression in business during the last half of 1903, which was, of course, felt very promptly by the rolling stock companies. Advantage was taken of the slack in orders to analyze the methods of the company and take inventories, and it is believed that general conditions were bettered thereby and methods improved, with the result of considerably reducing the costs and improving the quality of the work. During the year 20,683 all steel and composite cars were built; also, 4,481 underframes. For new construction $438,727 was spent, chiefly for the new plant for the manufacture of

forgings at the Allegheny works and for the erection of the new general office building at McKee's Rocks. It was found that serious delays resulted from reliance upon outside manufacturers for forgings. The balance sheet shows properties and franchises valued at $26,063,190, a net increase of $147,587 over last year, after reckoning the additions mentioned, less $260,000 charged off at the close of 1903 for depreciation, and $31,140 for value of machinery, etc., sold during the year. There are now only $3,500,000 of the 5 per cent. first mortgage gold notes outstanding, constituting almost the entire funded debt. There are also two purchase money mortgages, one on the McKee's Rocks plant and the other on the Allegheny plant, which aggregate $310,000 and bear interest at 4 per cent. The surplus balance now stands at $4,568,984 as against $4,331,479 last year. Besides the depreciation charge of $260,000, mentioned above, the practice of charging all repairs and renewals to cost of production has been continued, and the expenses on this account amounted to $529,000. From the inventory account $650,000 was also written off to represent changed conditions and actual values as of the present time.

THE SCRAP HEAP.

Notes.

The railroad commissioners of Louisiana have approved the action of the railroads of that State in abolishing return passes for drovers.

On the Pennsylvania Lines West of Pittsburg an order has been issued that all drinking water supplied to passenger trains shall be boiled, typhoid fever being prevalent in a number of towns in Ohio.

Mr. J. W. Midgley, who has been continuing his investigations into the cost to the railroads of carrying freight in cars owned by shippers, says that the private-car interests are manifesting violent opposition to his doings, and have induced railroad officers to ostracize him. The railroad men are in such fear of the "trust" that they do not dare to be seen in Mr. Midgley's presence.

According to a Harrisburg paper permissive block signaling is now authorized on the Pennsylvania Railroad between Rockville, near Harrisburg, and Downington, about 73 miles east of Harrisburg. The account indicates that hitherto the absolute block system has been enforced over this part of the line, but that the freight movement is now so heavy that it is necessary to permit two or more trains in a block section at the same time.

The Winnipeg *Free Press* says that the railroads in that region will continue to issue half rate tickets to clergymen, notwithstanding the provisions of the new railroad law. Evidently there is in Canada a feeling something like that which prevails in this country concerning certain laws which do not fit the conditions. "What is the Constitution between friends?" Or why should a statute trouble a G. P. A. when he wishes to do a favor to a clergyman?

According to a press despatch from Chicago, the Chicago & North Western has secured from the Government for the next fiscal year a much higher rate for the carriage of men traveling on the orders of the Navy Department than is paid at present. The contract, which embraces the lines from Chicago through to the Pacific coast, names a rate of $35.25 through, as against $20.74, the present rate. The lower rate is less than 1 cent a mile; the new rate is 1½ cents a mile.

"Asleep at the Throttle; Train takes Wrong Route while Engineman naps for an hour." This is the heading of a press despatch from Louisville, Ky., February 19, concerning a freight train on the Baltimore & Ohio Southwestern, which had been run on to a wrong track at Otisco, Ind., and, according to the veracious reporter, had continued its run for "nearly an hour"—or for 25 miles—on the line of another company. The item is amplified into a three-dollar "story," and, farther down, the length of the engineman's nap is given as "over an hour." The trainmen noticed the difference in scenery on the strange line, but did not notice the mistake in tracks! It appears that there is a basis of truth in this interesting yarn. An engineman fell asleep and ran six miles in a wrong direction before the conductor and brakeman succeeded in stopping him. It appears that the fireman was so slightly acquainted with the road that he did not notice the engineman's error.

The war in grain rates from Buffalo to New York and Philadelphia, which began about three weeks ago, had at last accounts degenerated into a contest between the Pennsylvania and the New York Central to see which would give the shipper the largest sum for the privilege of carrying his grain; though the fact that very little grain is being shipped this month suggests that the present episode ought perhaps to be looked upon as competition in tariffs only, not in the actual carriage of goods. The last rate announced was 2.2 cents per 100 lbs. on wheat from Buffalo to Philadelphia by the Pennsylvania, a reduction of more than 50 per cent. from the normal rate. A rate of 2.6 cents had been announced a few days before, but this was immediately followed by a similar announcement from the New York Central. For a long time the rate on grain from Erie to Philadelphia was one cent less than from Buffalo to New York, with constant complaint, of course, from New York grain dealers that Philadelphia was being unduly favored. Now, however, the Pennsylvania has a line to Philadelphia from Buffalo as well as from Erie, and the present cutting by that company is supposed to be an assertion of its "claim" that the establishment of a new line affords a suitable occasion for the revision of competitive rates. The present is the first pronounced disturbance in the rates from eastern Lake Erie ports since the Pennsylvania acquired the Western New York & Pennsylvania, giving it a line to Buffalo. Whether or not any of the reduced rates which have been made have been guaranteed to shippers beyond the opening of navigation, when grain will begin to move from Buffalo in large volumes, is a point on which the public has not been enlightened.

Chief Engineer of Imperial Chinese Railroads.

The position of Acting Chief Engineer and Acting First Assistant Engineer were abolished by a general order dated from Shanghai December 28. Captain C. W. Mead has been appointed Chief Engineer and Mr. Justin Burns First Assistant Engineer, taking effect Jan. 4, 1904.

Engineer for the Geological Survey.

The United States Civil Service Commission announces an examination on April 1 to secure eligibles for the position of Constructing Engineer in the Geological Survey, reclamation service, at salaries of from $3,600 to $4,800 a year. Particulars may be obtained from the United States Civil Service Commission, Washington, D. C. Examinations will also be held on April 6, 7 and 8 to fill two vacancies in the position of engineer draftsman in the office of supervising architect; one at $1,400 and the other at $1,600 a year.

New Scandinavian Line.

A new Scandia Line has been announced to commence a service on April 1, composed of ships from the Hamburg-American, Holland-American and Red Star lines. It is understood that the establishment of the new line is partly an act of retaliation against the Cunard Company for its recent movement to increase its Continental business and also an attack upon the present Scandinavian-American Line, as it is understood that the latter has refused to consider proposals from the Merger and German lines to enter the combination. It is probable that a sharp fight in rates will ensue.

Street Railroads in Paris.

Paris is blessed with tramways operating on every variety of electric system, but many of the companies have long been on the verge of bankruptcy. Important steps may be expected shortly in the direction of entire rearrangement. The Metropolitan is, by reason of its extensions, becoming a greater competitor, and succeeds in attracting an increasing share of the electric-car traffic. Drastic measures which have been suggested involve the canceling of leases or concessions which are held by a number of the companies who cannot even meet their working expenses. The extra Parliamentary Committee is still engaged upon the matter.

Dynamite Disaster at Jackson, Utah.

A rear collision of freight trains on the Southern Pacific at Jackson, Utah, on February 20, caused the explosion of two carloads of dynamite, and 24 men were killed. Fragments of five locomotives and a dozen freight cars were thrown incredible distances, and the shock was felt in Ogden, 81 miles away. The larger part of the victims were Greek laborers, who occupied boarding cars which stood near the spot where the explosion occurred. The collision is said to have been due to the inability of the men in charge of a freight train to control its speed by the air brakes. The total number of persons at Jackson station at the time of the explosion was 46, of whom only nine escaped death or injury. Jackson is near the western terminus of the Ogden-Lucin cut-off.

New Steamship for the Pacific Mail Company.

The new steamship "Mongolia" was delivered to the Pacific Mail Steamship Company by the builders, the New York Shipbuilding Company, of Camden, N. J., on February 15, and will shortly proceed to San Francisco to run on the line between that port and Honolulu, Japan, China and Manila. The "Mongolia" is 616 ft. long, 65 ft. wide and 51 ft. 3 in. deep, with a gross tonnage of 13,639 tons. She will carry about 450 cabin passengers and 1,300 steerage. The propelling machinery of the vessel consists of two sets of quadruple expansion engines to carry a boiler pressure of 215 lbs. The indicated h. p. is about 12,000. There are 8 boilers, four double and four single ended. Both types are 14 ft. 8 in. in diameter; the former are 20 ft. long, the latter 11 ft. long. The "Mongolia" is shortly to be followed by a sister ship called the "Manchuria."

The Tuxpam Canal.

Work has been commenced on a chain of shallow inland lagoons connecting Tuxpam with Tampico, Mexico, 125 miles. Under the direction of Capt. C. E. Shillaber, the work, which is a Government enterprise, is progressing rapidly. It is estimated that the canal will be completed in about three years. As the work advances the completed portions will be thrown open to traffic. It is therefore possible that before the next year the first section will be in active operation. There are 200 workmen employed on the canal. A powerful dredge has been purchased in the United States and is now working. The channel will be 8 ft. deep and 52 ft. wide. Traffic will be carried on by light-draft stern-wheel steamers, which will extend their operations along the Tuxpam River to headwater. The estimated cost of the work will be $3,000,000. The canal will open up a very fertile region, which up to this time has been almost isolated from the rest of the world.—Consular Report.

The Bacillus Britannica.

A wool sorter in England died from malignant pustule, which was started by a bacillus that lodged in his eye while he was at work, and his dependents were granted damages in a suit against his employer under the Employers' Liability Act. An employer is liable to employees for injuries while at work, as, for example, from a piece of steel flying into the eye; and the court holds that the deadly bacillus and its movements are to be considered on the same basis; the fact that this beast is of rather small size does not affect the principle. On behalf of the employer it was contended at the trial that the risk of disease was not the same as the risk of accident, but the court says that the clause of the law concerning disease risk means disease already present in the workman, and there was nothing to show that this particular workman had a disease when he went to his work. It is said that the case will be appealed to the House of Lords. The name of the bacillus is not given. It may be merely a baby melaphagus ovinus. Our title refers, not to the bug, but to the metaphorical bug that gets up queer cases in the English courts. This active organism seems to be much more insidious than any of the bacteria that the doctors tell us about.

The Panama Canal Commission.

The treaty with Panama for the construction of the Interoceanic Canal was ratified by the United States Senate on Tuesday. The President has not yet announced the names of the men who are to be appointed members of the Commission to supervise the construction of the canal, but even before the ratification of the treaty a number of names were discussed in Congressional circles and in the newspapers. Those most definitely mentioned are Rear-Admiral John G. Walker, Gen. George W. Davis, Col. Frank J. Hecker and Messrs. Alfred Noble, of New York; John Garber, of California; Benjamin M. Harrod, of Louisiana, and William Barclay Parsons, of New York. Mr. Noble is now engaged on important work for the Pennsylvania Railroad, but the newspapers say that probably the railroad company will be willing to make an arrangement by which Mr. Noble can, while continuing in the railroad service, accept the proffered position on the Commission. It is understood that Mr. Garber has declined his appointment and that some one else will be selected for the Pacific Coast. Mr. Parsons has lately accepted a temporary appointment under the London Transit Commission, but it is said that this will probably not interfere with his acceptance of the place on the Canal Commission.

What Constitutes a Valid Trade-Mark?

Judge Adams, of the United States Circuit Court, recently rendered at St. Louis an important decision affecting trade-marks. In a suit brought by the A. Leschen & Sons Rope Company against the Broderick & Bascom Rope Company, the plaintiff sought to enjoin the defendant from infringing its registered trade-mark, described as consisting of "a red or other distinctively colored streak applied to, or woven in, a wire rope. The color of the streak may be varied at will, so long as it is distinctive from the color of the body of the rope." The court declared that this mark did not accord with the first principles of the law governing the acquisition of valid trade-marks. That at common law the mark must be some symbol or device not descriptive of the character, quality or composition of an article or the place where made, but such a thing as indicates origin or ownership of the goods.

Referring to the provision of varying the color of the streak at will the court says that this permissible shifting of the most striking feature of the mark from time to time is in itself fatal to its validity. The fundamental purpose of a trade-mark being to indicate on sight the ownership or origin of the goods to which it is applied, it must be permanent. Numerous authorities are cited in support of these conclusions.

January Gross Earnings.

Bradstreet's reports a compilation of gross earnings for the month of January from roads operating over 83,000 miles, with earnings aggregating $51,000,949, a loss of $2,020,356, or 3.8 per cent., from the figures of January, 1903. This decrease is the first to occur since February, 1899, and the first for any January since 1897. The falling off is doubtless chiefly explainable by the remarkable combination of unfavorable circumstances, such as the comparative falling of the country's internal commerce, the diminished business in the iron and steel industry and the extreme cold weather, which not only has had a very unfavorable effect on gross earnings, but has also occasioned a great increase in operating expenses, although the latter is not shown in the following figures representing only the earnings. The return of gross earnings thus far made for the month of January is summarized as follows:

	1904.	1903.	Changes.	P. C.
Grangers	$4,766,032	$4,727,269	*$28,763	0.5
Central Western.	9,620,088	10,072,516	†452,428	4.4
Trunk lines	12,044,142	13,685,914	†1,641,772	11.9
Southern	12,573,972	12,169,726	*404,246	3.3
Southwestern ...	7,787,789	7,771,984	*15,805	0.1
Pacific	4,208,926	4,583,716	†374,790	8.1
Total	$51,000,949	$53,021,305	†$2,020,356	3.8

* Increase. † Decrease.

It will be noticed that three sections report decreases and a like number increases, the most important loss being returned by the trunk lines, which show a reduction of nearly 12 per cent., due entirely to unfavorable weather conditions.

Publication of Export Tariffs.

The Interstate Commerce Commission in an opinion by Commissioner Prouty has given its decision on the publication and filing of tariffs on export and import traffic. That law now requires the publication of import and export tariffs in the same manner as domestic tariffs. It is held that public policy urgently requires that the inland transportation of import and export commerce should be subject to the act to regulate commerce, and that the publishing and maintaining of tariffs upon such traffic imposes in most instances no hardship upon the carrier. There may be cases in which a modification of this rule would be of service to the carrier without detriment to the public, and perhaps other instances in which such a modification should be granted in the interest of both the carrier and the public. But this can only be accomplished by an amendment of the law, as the statute is mandatory. The commission decides to leave the matter as it is until opportunity has been afforded carriers to adjust their tariffs and to present the subject to Congress; but in the meantime all carriers which do not publish and maintain import and export tariffs must file with the Commission as promptly as possible a statement of the rates actually charged. It is evident that there must be uniformity in the enforcement of the law. One carrier cannot be expected to publish and maintain its tariffs while its competitor is relieved from that obligation. If the act is not amended within a reasonable time the Commission will deem it its duty to enforce it as it is.

Pennsylvania Railroad Classification of Expenses.

The Pennsylvania has a revised classification of expenses which went into effect January 1 last. The interstate commerce classification of expenses has many defects, which with local conditions and personal preferences of accounting officers have resulted in each road for its own purposes adopting a private classification of expenses. Such classifications are generally elaborations with slight changes of the I. C. C. classification.

In the Pennsylvania classification the distinction between getting tonnage (traffic department) and handling tonnage (transportation department) is very complete. The general distinction between fixed and flexible expenses is enforced throughout, as is also the distinction between labor and material. But the latter distinction has traditional rather than real value. The distinction between passenger and freight service where it is actual is preserved, but there is nothing in the classification to indicate whether the company intends to continue to apportion the indivisible expenses between these two services on some assumed basis. Pennsylvania has been the one road to adhere uncompromisingly to the old notion of dividing indivisible expense between passenger and freight service. No one questions the desirability of such a division if it were possible, but it is insupportably illogical.

This new classification makes a radical departure in undertaking a departmental division of insurance expense. It is to be regretted that the revising committee should have been so inconsistent as have stopped here and left "personal injuries" in one account under transportation expense. "Rents," which is the most unjustifiable account in the I. C. C. classification still holds its old place undisturbed although the proposition of splitting it into its constituent elements to accord with the general plan of the whole classification was seriously considered. The Pennsylvania is to be commended for this advance over former expense classifications, but the profound philosophy involved in properly classifying railroad expenses is still unexhausted.—*Wall Street Summary.*

Eastern Officials on the Traffic Situation.

The *Wall Street Journal* quotes the following opinions on the present traffic situation and outlook. An officer of the Pennsylvania Lines West says: "We are nearly as badly off as we were last year, so far as transportation is concerned, although business is not quite so large. The reason for this is that the cold spells have lasted longer and there has been more snow than last year. Loaded cars are stalled in both directions and equipment cannot be distributed to take care of business either way."

An officer of the Michigan Central says that the second week in February was the most difficult for the movement of traffic that his road has ever experienced, and that another fall of snow would tie it up completely. There is a large volume of tonnage in sight and if better weather comes the road will be kept busy moving it.

An officer of the Wabash says that the volume of business coming to that road is increasing, but eastern divisions of the company's lines have suffered severe car blockades and traffic has been greatly delayed. The spells of mild weather have been too short to permit an appreciable relief on congested sections.

An officer of the Lake Shore & Michigan Southern says that the first half of February will not make a good showing, and doubts if the last half of the month will do any better. With moderate weather it would take all that time to get out of the present tangle. The road is blockaded and short of cars everywhere, in the face of a steady growth in the demand for cars.

An officer of the Baltimore & Ohio says that although shippers are showing a disposition to hold back business a little on account of poor transportation, there is far more business thrown upon the road every day than it can handle with any degree of promptness. There is plenty of tonnage but the railroads must have favorable weather to handle it, and it would probably be weeks before conditions became normal even if better operating conditions came at once.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular mettings of railroad associations and engineering societies see advertising page 16.)

Franklin Institute.

A stated meeting of the Sections was held, Feb. 25, at the Hall of the Franklin Institute, Philadelphia. The programme included a paper on the Manufacture of Hydraulically Forged and Rolled Steel Wheels, by H. V. Loss, M. E.

Canadian Railway Club.

The next regular monthly meeting of this club will be held at the Windsor Hotel, Montreal, March 1. The topical questions held over from last meeting will be taken up and a paper will be read by President McHattie on "Compound Locomotives." A report will also be presented on the revision of the Master Car Builders' Rules of Interchange. The members of the club are invited to visit the Engineering buildings of McGill University on Tuesday afternoon.

The Railway Signal Association.

The March meeting of this Association will be held at the Great Northern Hotel, Chicago, on Tuesday, the 8th, beginning at 2 p. m. The questions proposed for discussion are the following, in automatic block signaling:

1. What is a signal failure? For example, when an engineman or a trainman reports encountering a caution or a stop indication which was due to "train in block," "open switch," "broken rail," "deranged equipment due to wreck," or "unknown," should such cases be reported as signal failures?

2. Should the rules require a stop at all home block signals, and should a "waiting time" be specified? How long should the waiting time be?

PERSONAL.

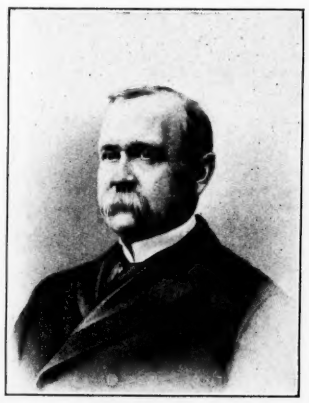
—Mr. George W. Wildin, for the past three years Mechanical Engineer of the Central of New Jersey, has been appointed Assistant Mechanical Superintendent of the Erie, with headquarters at Meadville, Pa. Mr. Wildin goes to the Erie well equipped to handle successfully the duties to which he will be assigned. He was born in Decatur, Ill., Feb. 28, 1870. In June, 1892, he was graduated from the State Agricultural and Mechanical College at Manhattan, Kan., with the degree of Bachelor of Science. Shortly after leaving college he entered the employ of the Atchison, Topeka & Santa Fe, at Topeka, as draftsman, and served that company in the shops and as a locomotive fireman for over four years. His later experiences were as locomotive engineer and on the Chief Engineer's staff of the Mexican Central; locomotive engineer, Chicago & Alton, and machinist, locomotive and car inspector and Mechanical Engineer of the Plant System. He left the last named road to go to the Central of New Jersey. Mr. Wildin is a member of the American Society of Mechanical Engineers, the Franklin Institute, the American Railway Master Mechanics' Association, the Master Car Builders' Association, the Air-Brake Men's Association, the Traveling Engineers' Association (First Vice-President) and the New York Railroad Club.

—Mr. H. H. Adams, who was recently promoted to be Superintendent of the Michigan Central at St. Thomas, Ont., is a graduate of Johns Hopkins University, class of 1897; also of the Massachusetts Institute of Technology (Civil Engineer) in 1899. In July of the last named year Mr. Adams began work as a rodman and draftsman on the Michigan Central. Two years later he was put in charge of construction work and in 1902 was made Assistant Chief Engineer. Later he was transferred to the office of the General Superintendent, and in December, 1902, was made Assistant Superintendent of the Canada Division, from which position he is now promoted.

—Mr. Robert Stewart, a veteran Telegraph Superintendent, died at Denver, Colo., January 22, at the age of 65. Mr. Stewart entered the telegraph service as an operator at Bordentown, N. J., in 1855. A few years later he was Superintendent of Telegraph of the Camden & Amboy Railroad and it was on this road, about 1863, that the space interval system of running trains was first used in the United States. Mr. Stewart afterward served on the Baltimore & Ohio, the New York Elevated and the New York, Chicago & St. Louis roads; and he was for a time Superintendent of the Bankers' & Merchants' Telegraph Company. His last railroad position was that of Superintendent of Telegraph of the Central of New Jersey, from which position he retired several years ago.

—Colonel Theodore Bruback, President and General Manager of the San Pete Valley Railroad, was killed at Park City on February 18. Col. Bruback was a mine operator and with Superintendent McSorley met with an accident while inspecting a mine. Col. Bruback was 53 years old, and was educated at Iron City College. He had been President and General Manager of the San Pete Valley since 1888.

—Mr. Edward A. Bond, of Watertown, N. Y., late State Engineer and Surveyor, has been chosen by Governor Odell to be Chairman of the Advisory Commission of the New York Barge Canal. Mr. Bond was born in Dexter, Mich., April 22, 1849. His first engineering work was on the Delaware, Lackawanna & Western in 1867, and he remained with that company until 1870, when he became Assistant to Thomas W. Spencer, Chief Engineer of the Utica & Black River. In 1875 Mr. Spencer resigned and Mr. Bond was appointed his successor, and he had charge of the building of the lines from Lowville to Clayton and Ogdensburg. In the Spring of 1886 he resigned to become Chief Engineer and General Superintendent of the Carthage & Adirondack Railway. In 1889 he left that road and went to Watertown and became a member of the engineering firm of Hinds & Bond. Mr. Bond has designed and executed many important engineering and public works at various points in New York and other states. In 1898 he was nominated by the Republican party for the position of State Engineer and was elected, and since then twice re-elected. In addition to his duties as State Engineer and Surveyor, Mr. Bond has been during his term of office a Commissioner of the Land Office, a member of the Canal Board, the Board of State Canvassers, the State Board of Equalization of Assessments and prior to their reformation was a member for several years of the State Board of Health and Forest Preserve Board, to which latter he was appointed in 1899 by Governor Roosevelt and as a member of which he rendered active service in the preservation of the fofest and water supply of the state. The improvement of public highways by means of state aid, which was inaugurated in 1898, has, during his administration of the department, been brought to an assured success and has become one of the most important features of public works in the state of New York. During the first four years of Mr. Bond's incumbency of office the subject of this radical enlargement of the canals of the state to connect Lake Erie at Buffalo and Lake Ontario at Oswego with the tide water in the Hudson at Troy required his serious consideration, and by direction of the legislature he conducted surveys and prepared an elaborate report of such permanent value that it has formed the basis of all subsequent legislation for canal enlargement.



—Mr. Frank Loomis, Special Counsel of the New York Central, led the uneventful life of the great lawyer who gives 40 years to the service of one corporation. Such services are never showy. The prevention of lawsuits, the avoidance of error and cabinet counsels are buried in the records and live only in the memories of the executive officers who have been so guided. During the entire period of development of the Vanderbilt system of railroads Mr. Loomis has served in positions of growing trust and responsibility as the confidential legal adviser and safe guide to the corporation and its owners. It would be incorrect to say that he steered the ship, and much less correct to say that he furnished the power, but it is quite fair to credit him with using the sextant, charting the course and warning off from reefs and shoals. He was born in 1838, graduated from Union College in 1860, studied law with his father, the late Judge Benjamin N. Loomis, of Binghamton, N. Y. In 1865, in the Commodore's time, he began service on the Hudson River Railroad, under Mr. Thomas M. North, Attorney and Counsel He succeeded Mr. Depew as General Counsel and so remained until failing eyesight, but not failing mental power, a few years ago compelled his retirement from charge of the department. He remained as special counsel until the time of his death a few days ago.

ELECTIONS AND APPOINTMENTS.

Atlanta & West Point.—Owing to continued ill health R. E. Lutz has resigned his position as Traffic Manager, but will act as General Agent of the A. & W. P., and the Western Railway of Alabama.

Baltimore & Ohio.—M. L. Byers, Assistant General Superintendent of Transportation, with headquarters at Baltimore, Md., has resigned.

A. W. Thompson, Superintendent at Cumberland, Md., has been transferred to Wheeling, W. Va., where he succeeds F. E. Blaser as Superintendent. Mr. Blaser has been transferred to Cumberland to succeed Mr. Thompson.

Central of Georgia.—On the first of this month the Divisions of this company were arranged as follows: The lines from Savannah to Macon, Millen to Augusta, Dover to Dublin, Gordon to Porterdale, and Savannah to Tybee will constitute the Savannah Division, with G. L. Chandler, Superintendent at Savannah, in charge; the lines from Macon to Atlanta, M. & A. Junction to Athens, Barnesville to Thomaston, Griffin to Chattanooga, Lyerly to Mill Creek, Chickamauga to Durham, and Cremo to Army Post will constitute the Macon Division, with C. B. Wilson, Superintendent at Macon, in charge; the lines from Macon to Montgomery, Fort Valley to Columbus, Fort Valley to Perry Smithville to Lockhart, Cuthbert Junction to Fort Gaines and Eufaula to Ozark will constitute the Southwestern Division, with J. H. Hall, Superintendent at Macon, in charge, and the lines from Columbus to Birmingham, Columbus to Americus, Columbus to Andalusia, Columbus to Greenville, and East Alabama Junction to Roanoke will constitute the Columbus Division, with H. B. Crawford, Superintendent at Columbus, in charge.

Chicago, Cincinnati & Louisville.—C. L. Nichols, hitherto Superintendent, has been appointed General Superintendent, with headquarters at Cincinnati, Ohio. W. I. Allen, General Manager, has resigned. J. K. Sroufe has been appointed Engineer of Maintenance of Way over all divisions, with headquarters at Cincinnati, Ohio, succeeding A. L. Kuehn, resigned.

Chicago, Rock Island & Pacific.—C. E. McKim, hitherto Superintendent of Telegraph of the Pennsylvania Company, has been appointed General Superintendent of Transportation of the C., R. I. & P.

W. J. Lawrence, formerly Superintendent of the Iowa Division at Des Moines, has been appointed Fuel Agent, with headquarters at Chicago, Ill., succeeding H. C. Angle, resigned.

Colorado & Southern.—J. D. Welsh, hitherto Superintendent of the Fort Worth & Denver City, has been appointed Superintendent of Car Service of the C. & S., with headquarters at Denver, Colo.

Delaware & Hudson.—J. W. Burdick having been relieved of the duties of the office of Superintendent of Telegraph to devote his entire attention to the duties of the office of General Passenger Agent, T. W. Crowley has been appointed Superintendent of Telegraph.

National of Mexico.—William Burckel has been appointed Purchasing and Fuel Agent, with headquarters in the City of Mexico. John H. Guess has been appointed Assistant Purchasing Agent, with headquarters at 30 Pine street, New York. J. S. MacKie has been elected Secretary and Assistant Treasurer, succeeding Mr. Burckel.

New York, New Haven & Hartford.—R. Fitzmaurice has been appointed Assistant Superintendent, with office at New London, Conn., succeeding H. E. Nettleton, resigned.

Oregon Short Line.—W. J. Tollerton has been appointed Master Mechanic of the Idaho and Montana Division, with headquarters at Pocatello, Idaho, succeeding D. J. Malone, who in turn is transferred to succeed Mr. Tollerton at Salt Lake City, Utah.

Pennsylvania Company.—G. A. Cellar has been appointed Superintendent of Telegraph, with headquarters at Pittsburg, Pa., succeeding C. E. McKim, resigned. (See Chicago, Rock Island & Pacific.)

Pere Marquette.—A. E. Snuggs has been appointed Assistant General Freight Agent, with headquarters at Milwaukee, Wis., succeeding G. C. Conn.

Pittsburg & Lake Erie.—A. P. Bixler has been appointed Assistant Auditor, with office at Pittsburg, Pa.

Seaboard Air Line.—Edward F. Cost has been elected Second Vice-President, with headquarters at Portsmouth, Va., having charge of traffic.

Southern Pacific.—G. J. Running has been appointed Resident Engineer, with headquarters at Portland, Ore., succeeding W. A. Grondahl, resigned.

Tavares & Gulf.—Robert H. England, hitherto Vice-President of the Buffalo, Bradford & Kane, has been elected Vice-President and General Manager of the T. & G.

Texas Southern.—J. N. Sanborn, hitherto Master Mechanic, has been appointed Superintendent of Motive Power, with headquarters at Marshall, Texas.

Union Pacific.—H. V. Hilliker, hitherto Assistant Superintendent at Green River, Wyo., has been appointed Assistant Superintendent at Evanston, Wyo., succeeding C. M. Ward, resigned.

Wabash.—W. A. Richards has been appointed Acting Engineer of Maintenance of Way, with headquarters at Decatur, Ill.

Western of Alabama.—See Atlanta & West Point.

LOCOMOTIVE BUILDING.

The Chicago, Indianapolis & Louisville has ordered four consolidation (2-8-0) locomotives from the American Locomotive Co., instead of two locomotives ordered from the Baldwin Works as reported in our issue of Jan. 29. These locomotives will weigh 188,000 lbs., with 168,000 lbs. on the drivers; cylinders, 21 in. x 28 in.; diameter of drivers, 57 in.; working steam pressure, 210 lbs.; tank capacity, 7,000 gallons of water and coal capacity, 15 tons.

CAR BUILDING.

The Boston & Maine is reported to be figuring on 15 passenger coaches.

The Baltimore & Ohio is reported in the market for passenger coaches.

The American Car & Foundry Co. has miscellaneous orders for 46 cars.

The Proctor & Gamble Company, Cincinnati, is in the market for 50 tank cars.

The Millen & Southwestern has ordered four passenger coaches from the American Car & Foundry Co.

The Chicago & North Western has ordered 500 flat cars from Pullman. The company is also in the market for 1,000 freight cars.

The Cleveland, Cincinnati, Chicago & St. Louis is reported to be contemplating asking bids on a large number of box, flat and gondola cars.

The Chicago, Milwaukee & St. Paul is about to build six mail cars, five combination mail and passenger cars, five baggage cars and a number of stock cars at its own shops.

The East St. Louis & Suburban, as reported in our issue of Feb. 19, has ordered 200 gondola cars of 80,000 lbs. capacity from the American Car & Foundry Co., for March, 1904, delivery. These cars will weigh 31,000 lbs. and will be 36 ft. long, 8 ft. 6 in. wide and 3 ft. 6¾ in. high, with wooden frames and underframes. Special equipment includes: Steel axles, American Steel Foundries' bolsters, Westinghouse brakes, Climax couplers, Miner draft rigging, gray iron journal boxes, Morris journal-box lids, Mineral red paint, rigid trucks and American Car & Foundry Co.'s wheels.

The Kohala & Hilo (Hawaiian Islands) is asking bids on 12 box and 10 flat cars of 80,000 lbs. capacity, one 50 ft. to 60 ft. combination passenger and baggage coach and one 50 ft. second-hand coach. The special equipment for all includes: Commonwealth bolsters for box and flat cars, Westinghouse air-brakes and friction draft rigging, Ajax brasses for box and flat cars, Kelso couplers, Acme curtain fixtures and Pantasote curtain material for combination passenger and baggage coach, Mexican Central galvanized iron roofs for box cars, Railway Steel Spring Co.'s springs and arch bar trucks for box and flat cars.

The Canadian Pacific will build 325 flat cars of 60,000 lbs. capacity and 216 box cars of 60,000 lbs. capacity at its own shops, for 1904 delivery. The flat cars will weigh 27,500 lbs., and measure 36 ft. 8 in. long, 8 ft. 10 in. wide over frames, and 4 ft. 2 in. high from top of deck; to be built of wood, with wooden underframes. The box cars will weigh 36,500 lbs., and measure 36 ft. 8 in. long, 9 ft. 1⅝ in. wide over frame, and 8 ft. high, inside measurement. The special equipment for both includes: Nova Scotia Steel Co.'s axles, Simplex bolsters and brake beams, Westinghouse air-brakes, St. Thomas Brass Co.'s brasses, Tower couplers, Jones doors for box cars, Miner draft rigging, Ryan dust guards, McCord journal boxes and lids, Sherwin-Williams and Canada Paint Co.'s paint, Chicago-Winslow roofs for box cars, Montreal Steel Co.'s springs, Barber diamond frame trucks, and 33-in. Canadian Pacific cast-iron wheels.

The Cincinnati, New Orleans & Texas Pacific (Queen & Crescent), as reported in our issue of Feb. 19, has ordered 675 box cars, 350 ventilated box cars, 250 28-ft. hopper cars and 200 38-ft. coke cars, all of 60,000 lbs. capacity, from the American Car & Foundry Co.; 675 box and 50 stock cars of 60,000 lbs. capacity from the Mt. Vernon Car Manufacturing Co., and 200 drop bottom gondola cars of 60,000 lbs. capacity from the Southern Car & Foundry Co. The box and stock cars will be 36 ft. long, 8 ft. 6 in. wide and 8 ft. high. The gondola cars will be 40 ft. long, 8 ft. 11 in. wide and 2 ft. 10 in. high, to be built of wood, with wooden underframes. The special equipment for all includes: open hearth steel axles, Simplex bolsters for box and gondola cars, American Steel Foundries' bolsters for stock cars, Simplex brake-beams, Westinghouse air-brakes, Climax couplers, National malleable door fastenings and Jones doors for box cars, Miner draft rigging, Symington dust guards, journal boxes and lids, Winslow roofs for box cars, Railway Steel-Spring Co.'s springs and arch bar trucks.

BRIDGE BUILDING.

ANDERSON, IND.—The City Council, at a special session, has made an appropriation of $18,000 for the Delaware Bridge over White River.

BEAUFORT, S. C.—Separate bids are wanted, April 4, for building a bridge of two spans each 70 ft. long; also a bridge 50 ft. long including the concrete bulkheads. W. S. Sanders is County Supervisor.

BROOKVILLE, IND.—Bids are wanted, March 7, by Chas. A. Miller, County Auditor, for reflooring bridges at White Water and for a new bridge at Salt Creek.

BUCYRUS, OHIO.—Bids are wanted, March 15, by Crawford County Commissioners, for building a steel truss bridge 120 ft. long over Sandusky River. C. P. Bryant is County Surveyor.

CAMPBELLTON, N. B.—Application will be made to the Dominion Parliament for the incorporation of the International Railway Bridge Co., of New Brunswick, to build a combined railroad and highway bridge across the Restigouche River between Campbellton, N. B., and Gaspe county, Que. A. I. Trueman, solicitor, Ottawa, represents the promoters.

CLEVELAND, OHIO.—The Cuyahoga County Commissioners have authorized the building of about 24 bridges, to cost about $70,000.

COATESVILLE, PA.—The Pennsylvania, it is reported, will shortly award a contract for the approaches of 1,500 ft. and 1,200 ft. to its new stone bridge, which is 900 ft. long.

GILBERTSVILLE, KY.—A bill was introduced last week in both Houses of Congress authorizing the Chicago, St. Louis & New Orleans Railroad to build a bridge over the Tennessee River, near Gilbertsville, Ky.

GRAFTON, N. DAK.—Bids are wanted, March 9, by the Board of County Commissioners, for building about 25 bridges in Walsh County.

GREENSBURG, IND.—Bids are wanted, March 7, by the Board of Commissioners, for a stone or concrete arch bridge over Clifty Creek.

HARRISBURG, PA.—The bids opened Feb. 18 by the Board of Public Buildings and Grounds for building the new steel bridge of four spans, each 150 ft. long and 32 ft. wide, with five-ft. sidewalks, over the Lehigh River and the tracks of the Jersey Central and the Lehigh Valley Traction Co. at Allentown were: Groton (N. Y.) Bridge Co., $230,000; Berlin Construction Co., New York, $229,900; Canton (Ohio) Bridge Co., $225,000; John A. Westbrook, Harrisburg, Pa., $223,500; McClintic-Marshall Construction Co., Pottstown, $222,300; Variety Iron Co., Cleveland, $219,000; Jos. H. Hendler, Wilkesbarre, $219,000; T. H. Prior & Sons, Trenton, N. J., $218,000; M. H. Stebbins, Wellsboro, $217,700; King Bridge Co., Cleveland, $216,400; Horn & Neff, Slatington, $216,390; Nelson & Buchanan Co., Chambersburg, $216,315; Crilly & Rathburn, Allentown, $216,000; National Bridge Co., New York, $215,000; Eyre Construction Co., Philadelphia, $214,750; York (Pa.) Bridge Co., $214,500; Penn Bridge Co., Beaver Falls, $213,340. The contract has not yet been awarded.

HAVRE DE GRACE, MD.—The Philadelphia, Baltimore & Washington is to build a new bridge over the Susquehanna River and has a bill before the Maryland Legislature authorizing it to do so. The bridge is to be double-track, of steel, with a pivot draw, and will be about 350 ft. north of the present structure.

HENRY, ILL.—The Commissioners of Highways have authorized the asking of bids for a large steel bridge over Clear Creek.

INDIANA.—In the Lower House of Congress, on Feb. 18, a bill was introduced authorizing the Southern Railway to build a railroad bridge over the Wabash River, in Vigo County, Indiana.

JANESVILLE, WIS.—Plans are being made for a bridge over Rock River to cost about $20,000. C. B. Kerch is City Engineer.

JOHNSTOWN, PA.—A company is to be formed to build an overhead bridge and incline plane in the Eleventh Ward, to reach Woodvale Heights.

LANCASTER, PA.—The new bridge of the Lancaster & York Furnace Electric R. R. over the Conestoga, recently destroyed by ice, may be replaced with a new structure to cost about $40,000.

MAYFIELD, OHIO.—Plans are being made for a bridge 156 ft. long, to be built at a cost of about $15,000.

MEMPHIS, TENN.—A bill will be introduced authorizing the building of a concrete culvert over the bayou, for which surveys are being made. J. A. Omberg is City Engineer.

MISSOURI.—In the Lower House of Congress, on Feb. 18, a bill was introduced authorizing the Paragould & Memphis Railroad Co. to build a bridge over the St. Francis River.

MONMOUTH, ILL.—Two bridges will soon be built over Cedar Creek.

MT. MORRIS, N. Y.—A new bridge may at once be built to replace the iron bridge over the Genesee, destroyed by ice, at a cost of about $15,000.

MUNCIE, IND.—Bids will soon be asked for rebuilding the bridge of the Indiana Union Traction Co., on North High street, recently damaged by floods.

NEPIGON, ONT.—The Nepigon Ry. Company's bridge over the Nepigon River, will consist of 3 spans of 150 ft. each on masonry abutments. R. A. Haslewood, Nepigon, Ont., is Chief Engineer.

PAISLEY, ONT.—The County Council will build a steel bridge over the Teeswater River, at Stark's Mills, Greenock Township.

PAOLA, KAN.—The County Commissioners are asking bids for building six steel bridges in Miami County.

PORT HURON, MICH.—Bids are wanted, Feb. 29, by the City Controller for a bascule bridge, 60 ft. wide, with a 70-ft. opening; also for a counterbalance bridge 52 ft. wide with a channel opening of 65 ft., to be built over Black River to connect Military street and Huron avenue.

RIVESVILLE, W. VA.—The United States Senate, on February 15, passed the bill authorizing the Buckhannon & Northern R. R. Co., of West Virginia, to build a bridge over the Monongahela River, near Rivesville, W. Va., the location and plans to be subject to the approval of the Secretary of War. (Jan. 22, p. 71.)

ST. JOSEPH, MO.—The bill authorizing the St. Joseph & Grand Island Ry. Co., in reconstructing its bridge over the Missouri River, to lower the bridge and shorten the draw spans, was passed by the United States Senate on Feb. 15 and by the House of Representatives on Feb. 19.

SALEM, IND.—Bids are wanted March 7 by the Board of County Commissioners for building a steel bridge with a 75-ft. span over Highland Creek, in Washington Township. Frank E. Morris is County Auditor.

SCRANTON, PA.—Bids are wanted March 12 by the County Commissioners for building several small bridges in Lackawanna County.

SEDALIA, MO.—Pettis County Court is considering petitions for the building of eight steel bridges.

SPRINGFIELD, MASS.—Plans are being made for building a new bridge over the Connecticut River.

SYRACUSE, N. Y.—The Board of Contract and Supplies has authorized the asking of bids for building a steel girder bridge over Onondaga Creek, on West Colvin street.

THIEF RIVER FALLS.—On Feb. 18 a bill was introduced in the United States Senate and House of Representatives authorizing a railroad bridge across Red Lake River, at the city of Thief River Falls, in Red Lake County, Minn.

TOPEKA, KAN.—Plans for the proposed East Eighth avenue bridge have been completed. They call for a 70-ft. bridge with a 20-ft. roadway, with five-ft. sidewalks to be built on 36-in. tubular piers.

TRENTON, N. J.—A resolution has been offered in the State Senate authorizing the appointment of a committee to arrange for the building of free bridges along the Delaware River from Port Jervis to tidewater. The Commissioners are to confer with the Governor and other officials of Pennsylvania and ask that state to share the expense of this work.

WARREN, PA.—The borough has voted to increase the debt $40,000 for the purpose of building two new bridges.

WASHINGTON, D. C.—The bids opened Feb. 16 for building the proposed bridge over Rock Creek on the line of Connecticut avenue were for trimmings of stone, and trimmings of concrete construction, as follows: District Construction Co., of Washington, $950,000 and $597,595; Brennen Construction Co., of Washington, $760,000 and $643,000; The Sand Filtration Corporation of America, $764,277 and $647,572; Charles F. Taylor & Co., Syracuse, $790,000 and $692,000, and the Penn Bridge Co., for a bridge with concrete trimmings, $629,869. The contract will be awarded within a few days.

WINNIPEG, MAN.—Bids are wanted March 15 by the Secretary of the Municipality of Whitewater at Minto village for building a bridge over Souris River at Shepherd's Ferry Crossing. Alex. Rose, Reeve.

Other Structures.

ARKANSAS CITY, KAN.—The Atchison, Topeka & Santa Fe is considering plans for building additions to its shops.

BALTIMORE, MD.—The Baltimore & Ohio has selected the site for its new building, in which the chief offices of the company will be located, to replace the one destroyed in the recent fire. It will occupy an entire block. Plans are now being made.

BIRMINGHAM, ALA.—The Seaboard Air Line expects to build a passenger station at Birmingham as soon as a site is settled on.

CHARLOTTESVILLE, VA.—The Chesapeake & Ohio, it is reported, will build a new passenger station, to cost about $25,000.

COLUMBUS, OHIO.—The Cleveland, Cincinnati, Chicago & St. Louis has selected the site for its large new freight house at the southeast corner of Swan and High streets.

LEXINGTON, KY.—The Chesapeake & Ohio, it is reported, is making plans for building a new passenger station.

MCADAM, N. B.—It is reported that a large addition to the Canadian Pacific station here will be made next spring and the present structure remodeled.

NORTON, VA.—The Norton Foundry Company will build a shop 70 ft. x 100 ft.

PHILADELPHIA, PA.—The American Metal & Stamping Company, recently incorporated with a capital stock of $250,000, will build new works in addition to the two it now has at Germantown, Philadelphia, for which plans have been completed.

REVELSTOKE, B. C.—The Canadian Pacific will build a new brick and stone station and offices.

SALISBURY, N. C.—The Southern Railway, according to local reports, has bought a tract of land on which it proposes to build a large freight house.

SALT LAKE CITY, UTAH.—The Oregon Short Line will soon commence work on its new shops, and, when completed, will begin work on the new passenger station.

TORONTO, ONT.—The Grand Trunk, it is reported, has bought land on which to build a new passenger station.

WATERBURY, CONN.—The New York, New Haven & Hartford, local reports say, has bought land at the foot of Judd street to be used as a site for the new union passenger station.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BALTIMORE & OHIO.—An officer writes that nothing definite has been decided with regard to the cut-off from Mannington, W. Va., southwest to Smithfield, 30 miles. It is not probable, however, that work will be begun on this line for some time to come. (Feb. 19, p. 136.)

BOWIE, LAFOURCHE & NORTHWESTERN.—Press reports state that this company is about to build from Bowie, La., to Thibodaux, 12 miles. Surveys have been completed. J. R. Downman, New Orleans, La., is Chief Engineer.

CHESAPEAKE & OHIO.—It is reported that this company will soon begin work on the construction of new gravity yards about 10 miles east of Cincinnati.

CHESTER, PERRYVILLE & STE. GENEVIEVE.—Surveys have been completed for an extension of this line from West Chester, Mo., southwest to Frederickton, 30 miles. The road runs at present between Ste. Genevieve, Mo., and West Chester, 20 miles. J. C. Houck, Perryville, Mo., is Superintendent.

CHICAGO & NORTH WESTERN.—It is reported that this company will build a cut-off from Alden, Iowa, northwest to Eagle Grove, 25 miles.

CHICAGO, JOLIET & IOWA.—Articles of incorporation have been filed by this company in Illinois. It is proposed to build from Chicago southwest through the counties of Cook, Will, Kendal, Lasalle, Bureau, Stark and Knox to Monmouth, 170 miles. G. R. Montgomery, H. W. Paddock, L. E. Hunt and C. W. Chase, all of Chicago, are incorporators.

CHICAGO, MILWAUKEE & ST. PAUL.—Press reports state that this company will begin work in the spring on a second track from Portage, Wis., to Doylestown, 20 miles, and also from Camp Douglas to Tomah, 15 miles. This is part of the plan of the company to double track the entire main line between La Crosse, Wis., and Milwaukee.

COOSA VALLEY.—Work is reported in progress on an extension of this road from Gandy, Ala., to Wolf Creek, two miles. The road runs at present between Pell City and Gandy, 14 miles. F. H. Lathrop, Riverside, Ala., is President.

CRAWFORD BAY AND ST. MARY'S RY.—Application will be made at the next session of the Dominion Parliament for the incorporation of a company to build from Crawford Bay, on Kootenay Lake, B. C., via St. Mary's River Valley to Fort Steele, B. C. Macdonald & Winn, Rossland, B. C., represent the promoters.

ERIE.—This company has practically completed surveys for a new branch line from Port Jervis, N. Y., to Newhampton. A tunnel will have to be built under the Shawangunk Mountains, near Bloomingburg. The new branch will be about 30 miles long and will do away with the present steep grades between these two points.

GEORGIA ROADS.—Press reports state that the Georgia Granite Company will build a line 3½ miles long from Lithonia, Ga., to Rock Chapel Mountain. E. S. McCandless, Lithonia, Ga., is interested.

GREAT NORTHERN.—Contracts will probably be let early in the spring for two extensions, the one from Pelican Rapids and the other from Thief River Falls, both running almost due north toward the Canadian boundary. A. H. Hogeland, St. Paul, is Chief Engineer.

GROTON & STONINGTON (ELECTRIC).—The contract for building this electric road from Groton, Conn., east to Stonington, 12 miles, has been let to the J. B. Macafee Co., of Philadelphia. The contract calls for the completion of the line by July 1, 1904. The road will parallel the New York, New Haven & Hartford between these points.

HOLTON R. R.—It is reported that this company has been organized to build a railroad from Holton, Cal., to Imperial, 12 miles. Contracts are reported let, and it is stated that the work will be begun at once. W. F. Hold, Redlands, Cal., is President.

LINCOLN, SAN FRANCISCO & EASTERN.—It is stated that work will be begun on this new road by March 1. The line is projected from Vernon Landing, Cal., northeast to Nevada City, Cal., 68 miles. Rights of way have been secured and surveys completed. C. L. Wilson, Nevada Block, San Francisco, Cal., is President. (Oct. 23, p. 768.)

LITTLE ROCK & MONROE.—An officer writes that 20 miles have been graded on this new line from Lapile, Ark., south via Ouachita to Monroe, La., 50 miles. Track laying is in progress. T. M. Dodson & Sons, Eldorado, Ark., have the contract for building the line. The work is light, with a maximum grade of .6 of one per cent. and a maximum curvature of 3 degrees. C. D. Johnson, Equitable Building, St. Louis, Mo., is President. (Sept. 18, p. 680.)

LOUISVILLE & ATLANTIC.—It is reported that this company will build an extension from Beattyville Junction, Ky., through Wolfe, Breathitt, Magoffin, Floyd and Pike counties to the West Virginia State line, 80 miles. The road runs at present between Versailles and Beattyville Junction, 101 miles. A. C. Hone, Versailles, Ky., is General Manager.

MACOUPIN COUNTY.—This road has been graded from Girard, Ill., to a point four miles south of Gillespie in Macoupin County, a distance of 24 miles. Track laying is now in progress. Connection will be made with the Chicago & Alton and with the Jacksonville & St. Louis railroads at Girard. H. S. Dorsey, Gillespie, Ill., is President and F. E. Stanley is Chief Engineer. (July 31, p. 562.)

MICHIGAN ROADS.—Press reports state that the Hermansville Lumber Company, which owns a mill in the vicinity of Mastodon, Mich., will build seven miles of railroad in Iron County to connect with the Chicago & North Western at Pentoga, Mich.

MIDDLETOWN & CECIL.—The incorporation of this company is being asked in Maryland with power to operate a freight line in Cecil County along Chesapeake Bay and the Sassafras River. W. R. Davis and E. S. Short, Cecil, and E. R. Cochran, Jr., Wilmington, Del., are incorporators.

MIDLAND VALLEY.—Surveys are reported in progress on an extension of this line from Panama, Ind. T., to Muskogee, 60 miles. It is stated that work will be begun very shortly and that the line will eventually be extended to Wichita, Kan., 250 miles.

MINIDOKA & SOUTHEASTERN.—An officer writes that the proposed route of this road is from Minidoka, Idaho, southwest through Jessie, Milner and Rock Creek to the Salmon River, 85 miles. The work will be light, with a maximum grade of .8 of one per cent. and a maximum curvature of 3 degrees. It is not probable that any grading will be done on the road during 1904. E. E. Calvin, Salt Lake City, Utah, is President and W. M. Ashton is Chief Engineer. (Feb. 5, p. 104.)

MISSISSIPPI VALLEY.—An officer writes that the proposed route of this road is from Tyler, Mo., west through Cooter and Steele to Coats, Mo., 25 miles, with a branch 10 miles long to Blytheville, Ark. The work will be light, with a maximum grade of .2 of one per cent. and a maximum curvature of 3 degrees. Contracts for grading will be let about March 10. W. E. Ayres, Osceola, Ark., is Chief Engineer and H. A. Tyler, Hickman, Ky., is President. (Feb. 12, p. 120.)

MISSOURI & OKLAHOMA CENTRAL.—A charter has been granted this company in Oklahoma to build a line 250 miles long from Carthage, Mo., through Joplin, Mo., and the Quapaw and Osage reservations in Oklahoma, to the western boundary of Woods County. The incorporators are Henry Burt, T. J. Lowe, Albert Hughes and others, of Guthrie, Okla. T.

MISSOURI, KANSAS & OKLAHOMA (M. K. & T.).—This road, recently completed from Stevens, Ind. T., to Oklahoma City, 175 miles, was opened for traffic on Feb. 22. It will be operated as a branch of the Missouri, Kansas & Texas.

NACOGDOCHES SOUTHEASTERN.—Work has been begun on this line from Nacogdoches, Texas, to a point on the Atoyac River, 25 miles. It is stated that about half the line will be finished by next autumn. C. C. Hayward and W. H. Kimball, Nacogdoches, Texas, are interested. (Jan. 8, p. 34.)

NORFOLK & SOUTHERN.—This company has purchased the Washington & Plymouth Railroad, which runs between Plymouth, N. C., and Washington, 33 miles. It is the intention of the new company to build a connection between its line and the Washington & Plymouth from Mackey's Ferry southwest to Plymouth, a distance of eight miles. M. K. King, Norfolk, Va., is General Manager.

OKAW & EASTERN.—Articles of incorporation have been filed by this company in Illinois. It is proposed to build from East St. Louis in an easterly direction through St. Clair, Madison, Clinton, Marion, Clay and other counties to the Indiana border. J. L. Brown, Lincoln, Ill.; N. S. Forman and H. S. Brown, East St. Louis, are incorporators.

PAMLICO, ORIENTAL & WESTERN.—An officer writes that grading is practically completed on this new line from Newbern, N. C., through Dayboro, Stonewall, Oriental and Vandemeer to a point on Pamlico Sound, 55 miles. W. A. Cullen Construction Co., 25 Broad street, New York City, is the contractor. Track laying will be begun early in the spring, and it is expected that the entire line will be open for traffic before the end of the year. M. D. Stephenson, Newbern, N. C., is interested. (Sept. 25, p. 698.)

PENNSYLVANIA.—The report that this company had rejected all the bids of the various contractors for building its tunnel under the North River has been officially denied. It is stated that the bids originally submitted have not proved entirely satisfactory and that an arrangement will probably be made with one of the contractors to undertake the work on a percentage contract. The company will not build the tunnel with its own forces.

VIRGINIA & SOUTHWESTERN.—Surveys are reported in progress for an extension from Elizabethton, Tenn., west to Okalona, 12 miles. The new line will parallel the Southern between these points. J. B. Newton, Bristol, Tenn., is Vice-President and General Manager. (Sept. 4, p. 642.)

ST. LOUIS & SAN FRANCISCO.—An officer denies the report that this company is about to build a branch from Aberdeen, Miss., to Columbus.

ST. LOUIS, BROWNSVILLE & MEXICO.—Track has been laid from Robstown, Texas, south toward Brownsville for a distance of 70 miles. The line between these two points, 141 miles, has been located, and it is reported that the entire road will be finished and put in operation about June 1. The Hidalgo branch, from a point on the main land to Hidalgo, Texas, 57 miles, has been surveyed and work will be begun at once. An extension will also be built north from Robstown to Sinton, Texas, 20 miles. For new extensions authorized by the directors, see Feb. 5, p. 104.

SANTA CLARA VALLEY TRANSIT.—This company has been incorporated in California to build a number of electric lines in and about the city of San Jose, with branches to Palo Alto and to Malpitas. The estimated length of the entire road is 35 miles. F. M. Lockwood, J. A. Mehling, W. C. Andrews, A. D. Cutler and others, of San Jose, Cal., are interested.

SUWANEE & SAN PEDRO.—Surveys are reported in progress on an extension from Perry, Fla., northwest to Wacissa, 30 miles. Connection will be made at the latter point with the Tallahassee Southeastern. Frank Drew, Live Oak, Fla., is President and General Manager and R. N. Ellis, Jr., is Chief Engineer.

WABASH & ROCHESTER (ELECTRIC).—Press reports state that grading will probably be begun on this electric railroad within 30 days. The proposed route is from Wabash, Ind., to Rochester, 30 miles. P. A. Tuttle, Geneva, Ohio, is President, and W. H. Wiley, Wabash, Ind., is the engineer in charge of the work.

WASHINGTON & PLYMOUTH.—See Norfolk & Southern, above.

GENERAL RAILROAD NEWS.

ATLANTIC & BIRMINGHAM.—See Brunswick & Birmingham below.

BRUNSWICK & BIRMINGHAM.—It is stated that this road will be consolidated with the Atlantic & Birmingham on March 15, when the option held by the latter company expires. C. T. Hyde, Chairman of the board of directors, has said: "This consolidation practically assures the building of a line as projected from Brunswick to Birmingham and will give the Atlantic & Birmingham tidewater outlet at Brunswick."

DELAWARE, LACKAWANNA & WESTERN.—The report of this company for the twelve months ending December 31, 1903, shows an increase in gross earnings of $7,782,199, or an increase of 36 per cent. over 1902. Earnings from coal traffic increased $5,680,000, or about 70 per cent., and passenger earnings showed an increase of $491,000, or 10 per cent. Operating expenses increased $1,529,489, leaving an increase of $6,216,218, or 89 per cent. in net earnings. After the payment of the regular 7 per cent. dividends on the common stock, the surplus for the year was $4,251,000, as against a deficit of $2,180,000 reported in 1902. President Truesdale says in part: "The growth in the company's general freight traffic seems to be steady and general and not due to any spurt of activity in any particular direction nor during any one portion of the year. The numerous new industries and business enterprises which the officials of the company have been instrumental in locating on the lines of the company during the past few years have, no doubt, also contributed largely to this steady increase in its general freight business. It is planned to construct new and modern passenger car repair shops near Hoboken during the coming year. There is apparent to every observer of events a decided halt in the remarkable business and industrial activity of the past three years, and with the uncertainty that proverbially marks what is generally termed the Presidential year, together with other factors in the situation which tend to quiet and conservatism, it is too much to expect that the business and earnings of this company, or the railroads generally, will continue to increase as they have done since 1900. The business conditions of the country generally are certainly sound and prosperous; the crops of the past year were fully up to the average, and the prices being realized by the producers of them are above the average. It is difficult to see, therefore, how any severe setback from the prosperous conditions of the past four years can be possible during the coming year."

DES MOINES, NORTHERN & WESTERN.—See Gulf & Interstate below.

GULF & INTERSTATE.—This road, which runs between Galveston, Texas, and Beaumont, 70 miles, has been sold to the Des Moines, Northern & Western R. R., a subsidiary company of the Rock Island System. The road, which has been in the hands of a receiver for the past six years, has now been reorganized with the following officers: L. P. Weatherstone, Galveston, Texas, President; F. M. Hubbell, Vice-President; D. B. Henderson, C. H. Moore and C. R. Campbell, Directors.

LAKE ERIE & DETROIT RIVER.—It has been announced that after March 1, 1904, this road, which is about 200 miles long, will be operated as a part of the Pere Marquette system. The Lake Erie & Detroit River has been owned by the Pere Marquette for the past two years, but has been operated separately.

LAKE ERIE, BOWLING GREEN & NAPOLEON (ELECTRIC).—This company has recently filed a mortgage with the Union Trust Company, of Detroit, as trustee, for $1,000,000 5 per cent. 30-year gold bonds. It is stated that the proceeds from the sale will be used for new extensions. The road runs at present between Bowling Green, Ohio and Pemberville, 13 miles, and is projected from Port Clinton through Oak Harbor, Woodville and Bowling Green to Napoleon, 65 miles. W. H. Tuller, Bowling Green, is President.

NEW YORK CITY STREET RY.—This name was formally assumed on Feb. 16 by the Interurban Street Ry., in accordance with the recent order of the Court, approving the company's application.

NEW YORK, NEW HAVEN & HARTFORD.—This company has recently purchased several additional pieces of land for the purpose of four-tracking its main line in the city of New Haven.

PERE MARQUETTE.—See Lake Erie & Detroit River above.

WESTERN PACIFIC.—This company has purchased the Alameda & San Joaquin R. R., which runs between Stockton, Cal., and Tesla, 30 miles. It is stated that part of the $50,000,000 of bonds for which this company recently gave a mortgage to the Bowling Green Trust Company, of New York, will be used to pay for the road.